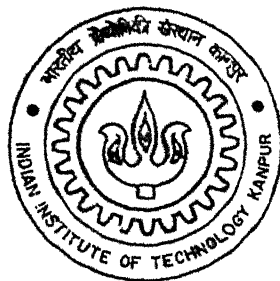


IT SCENARIO IN IIT KANPUR

By

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FEBRUARY, 2003

IT SCENARIO IN IIT KANPUR

A Thesis Submitted

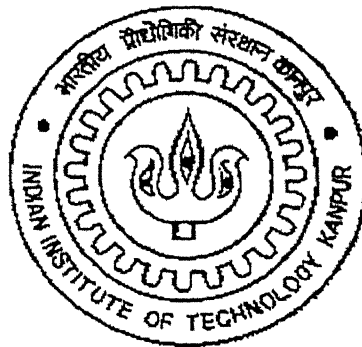
In Partial Fulfillment of the Requirements

for the Degree of

MASTER OF TECHNOLOGY

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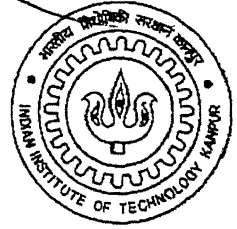
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CERTIFICATE



It is to certified that the work contained in this report entitled, "IT Scenario in IIT Kanpur" is the original work carried out by Himanshu Sadana (Roll No. Y111407) under my supervision and has not been submitted elsewhere for a degree.

(Dr. Veena Bansal)

२७ February 2003

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SYNOPSIS

Evaluation of IT system is not a new term for corporate world but as far as the evaluation for academic institutes is concerned not much work has been done.

The present dissertation is a step in this direction by evaluating IT system of IIT Kanpur.

We first introduce and discuss various methods for IT evaluation, most of which are business oriented but can be implemented in academic institutes with modifications. We next propose our method for evaluating IT system of IIT Kanpur which is based on survey research. Target population for the survey is the students and the computer lab administrators. Scoring technique is used to quantify the views of the participants.

Through this thesis, we want to provide a report which can help the institute to provide better IT system to support teaching, learning and research.

To my parents

Acknowledgement

I take this as an opportunity to convey my deep sense of gratitude towards my thesis supervisor Dr. Veena Bansal for her guidance, concern and meticulous attention throughout my tenure at I.I.T Kanpur. She has extended helping hand during difficult times, both professional and personal, and was the person-to-look for guidance during such times.

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Last but the most important support has come from my family members and almighty for this endeavor.

Himanshu Sadana

IIT Kanpur

February 26th, 2003

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The amount of funds spent on IT investment has always been controversial. For many years it has been thought by some executives that too much has been spent and not enough return has been obtained from this IT expenditure. Robert Solow [15] the famous Nobel Prize winning economist has suggested that in business one could see computers everywhere but in the productivity statistics. Brynjolfsson [3] pointed out that there was a productivity paradox, which meant that computers were not delivering, the value promised. The Economist in 1991 claimed the return on IT was so poor that organizations:

would have done better... to have invested that same capital in almost any other part of their business [5]

1.1 Purpose of an IT System

The purpose of the IT System is most critical to the process of defining the approach to its evaluation and to its performance measurement. There are a number of purposes of an IT System. Following are a few:

- Improving efficiency
- Improving effectiveness
- Competitive leap
- Survival
- Infrastructure

1.2 Why evaluate IT scenario?

In corporate world the evaluation of IT is at best a difficult process, which in some certain circumstances can be quite costly and therefore should be made clear to everybody why this process is being undertaken. The main reason behind the evaluation

of IT system is that there is considerable doubt in many circles that investment in IT has proved beneficial at all. It is clear that investment in IT is high therefore it is essential to be sure that this investment is justifiable.

1.3 The problems with IT benefit measurement and management

The measuring and managing of IT benefits is a difficult challenge that has plagued the IT industry, IT professionals, consultants and academics, for many years. The main reason for this is that despite the considerable amount of research conducted by academics and consultants so far no comprehensive or rigorous method of evaluation has been developed

There have been four major areas that have contributed to the problems with IT benefit measurement and management. These are:

- 1) Benefits and identifiable performance improvements
- 2) The issues of information systems reach
- 3) Tangible and intangible benefits
- 4) Benefit evolution

In the first place evaluation of IT is made difficult because of the types of benefit that organization can expect to derive from its application. These benefits range from improved efficiency to enhanced effectiveness. Both these notions of efficiency and effectiveness may take numerous forms and much of the task of evaluation of IT investment involves understanding these phenomena.

Generally speaking benefits are divided into two basic groups, which may be described as tangible benefits and intangible benefits. Although tangible are inclined to be straightforward to evaluate, some benefits are intangible in that they can clearly be seen to, for example, provide better information. However, this is difficult to measure, and it is even harder to directly link the end benefit to an improvement in the performance of the institute.

1.4 Objective of the Present Work

The present dissertation is an attempt to evaluate the Information Technology System of IIT Kanpur. Specifically this work has the following objectives:

- To ascertain whether the users are satisfied with the system
- To ascertain where the users are satisfied or dissatisfied.
- To find out what contributes to their disappointment
- To find out how the users rate the facilities provided
- To prioritize improvement opportunities.

The overall goal is to provide a report which can help the institute to provide better IT system to support teaching, learning and research.

Another objective is to give a new insight of the IT scenario to the institute. The evaluation process is in itself a learning experience. By conducting an IT evaluation in IIT Kanpur, the institute will learn how well it used its funds and the intellectual capital. This will give the institute the opportunity to understand how IT may be better employed and a feedback process may be put in place in hope that better decisions are made next time around.

Although it is likely that some form of evaluation is constantly taking place in the IT environment of the institute, perhaps it is on an informal basis, with administration making judgments based only on its own perceptions. Indeed, sometimes these judgments are based on the level of complaints made about a computer system. In such cases the decisions of those members of staff who are most verbal or animated get to be known and they receive an inordinate amount of the IT support or investment resources. This usually regarded as being unsatisfactory. It is important, therefore, to establish a formal evaluation process whereby administration can make decisions on the actions most appropriate to the institute.

Therefore there is a very deep need to regularly measure performance of the institute to enhance performance as well as to ensure growth. Both performance and growth enhancement are required to meet stake holding expectations from the institute.

1.5 What constitutes good performance?

As far as this work is concerned we are concentrating only on IIT Kanpur. Being an academic institute of high repute, performance measures like reputation, academic excellence, user satisfaction are far more important then the monitory factors. Therefore we will measure the performance of the IT system based on the reputation, academic excellence, user satisfaction etc. only while ignoring the economical aspects.

1.6 Organization of the Thesis

Chapter two entitled **Literature Review** provides a reference for the IT evaluation during the last years and also gives an idea of the basis of IT evaluation. It covers the different techniques for the IT evaluation techniques.

Chapter three entitled **The Proposed Evaluation Technique** covers in detail about our approach of evaluating IT system of IIT Kanpur.

Chapter four entitled **Execution and Results** covers the details of data collection and results of the study.

Chapter five discusses **Conclusion and Suggestions**. In this chapter strengths, weaknesses and a list of action points is given.

Appendix I specifies **Student Questionnaire**

Appendix II specifies **Administration Questionnaire**.

...if nothing changes about the way work is done and the role of IT is simply to automate an existing process, benefits are likely to be minimal.

Thomas Davenport [4]

The process of IT evaluation is mainly done in the corporate word. Most of the companies now days are getting evaluated their IT system in order to correlate it with the overall objective of the company. A lot of work had been done for IT evaluation as far as corporate word is concerned.

Not much literature is available for such kind of evaluation being done for an academic institute; most of the techniques for evaluation of IT are business oriented.

The purpose of this chapter is to review key studies from the research and the techniques of IT evaluation, most of which are business oriented, but still can be implemented in an academic institute with some modifications.

2.1 How Well is IT System Doing?

There is no simple answer to this question. Some organizations are content with establishing whether their objectives are being met? This is relatively easy, especially if objectives and key performance indicators were predetermined.

However, other organizations want a more absolute evaluation. There are basically only two ways of approaching this type of evaluation. One, the organization can compare themselves to their competitors. Organization may often obtain a significant amount of information about the way competitors are using IT.

The second approach to answering the question of how well the IT system is doing is to compare current performance with the historic performance, which requires the existence of a database of detailed measurements of performance of IT. This is the most satisfactory way of answering the question.

2.2 A Concept of Value

The objective of this chapter is to discuss methodologies by which it will be possible to evaluate the benefits derived from the application of Information Technology. In achieving this, it will be necessary to consider inter alia, how it is possible to convert the benefits generated by systems based on IT into measurable values, as well as how it will be possible to place specific values on less tangible forms of benefits.

Before such an exercise can be contemplated, it is essential to establish a framework in which the value of systems may be assessed. The shorter Oxford English Dictionary states that:

Value is the amount of some commodity, medium exchange, etc., which is considered to be an equivalent for something else; a fair or adequate equivalent or return. [16]

In business terms, a rough and ready definition of value is generally accepted to be the amount of money that changes hands when a willing buyer trades a good or service with a willing seller.

2.3 The Assessment of IT System

The assessment or evaluation of IT, and especially IT effectiveness, is a difficult task that needs to be undertaken with considerable care. In addition, attention should be paid to the reasons why the assessment is being undertaken, as the approach to the evaluation depends on the purpose for which it will be used. In practice an important consideration is the individual who commissions the IT effectiveness study.

If the administration is asking the question of effectiveness, then the focus is probably on the issue of whether the computers are enhancing the general performance of the organization as a whole?

If this question of effectiveness is being asked by the operating management, the focus of effectiveness is probably directed at the issue of whether the organization is getting the most from IT investment.

If this question of effectiveness is being asked by the end users, the focus of effectiveness is probably directed at the issue of whether the IT is helping in their pursuit of excellence.

This means that a much more general position needs to be considered as it is possible for a computer to enhance effectiveness and efficiency at the expense of the overall objective of the institute.

2.4 Choice of Evaluation Methodology

There is in fact a bewildering choice of evaluation methodologies available to management. Each methodology is designed to assess the organization's IT effectiveness in a different way. The critical skill is to be able to select the methodology most appropriate for the organization's particular circumstances. In the following section a number of evaluation techniques are given according to the application.

2.5 Issues and Techniques for IT Evaluation

The purpose of the investment is most critical to the process of defining the approach to its evaluation and to its performance measurement. As mentioned in one of the previous sections there are various evaluation techniques however it is a matter of type of application that which evaluation technique is most appropriate. For example IT investment that is used to improve efficiency requires efficiency measuring techniques such as work study or cost benefit analysis. IT investment which has been implemented to enhance management effectiveness requires value added analysis, value chain assessment, etc. IT investment for business advantage or business transformation requires measuring techniques such as strategic analysis, relative competitive performance, etc.

2.5.1 Different Approaches to Measurement

There are two generic approaches to measurement. These approaches are common to all forms of measurement, whether the measurement relates to speed, obesity, water flow, beauty contests, weighing potatoes or assessing information systems.

Measurement may be based upon:

- Physical counting
- Assessment by ordering, ranking or scoring.

Whether the contents of a tanker, the weight of a boxer or the speed of a jet plane are being measured, units are being counted. When it is difficult or not feasible to count, the assessment is made by ordering, ranking or scoring. [14]

2.5.2 Specific Methodologies

There are several different methodologies available to assess the performance of IT. The following are a few of the most commonly used. [14]

- 1) Strategic match analysis and evaluation
- 2) Value chain assessment
- 3) Relative competitive performance
- 4) Proportion of management vision achieved
- 5) Work study assessment
- 6) Economic assessment- I/O analysis
- 7) User attitudes
- 8) User utility assessment
- 9) Value added analysis
- 10) Return on management
- 11) Multi-objective, multi- criteria methods

2.5.2.1 Strategic Match Analysis and Evaluation

This is a ranking and scoring technique that required the entire primary IT systems to be assessed in terms of whether or not they support the organization's generic strategy. The two main generic strategies are differentiation and cost reduction. If a system helps improve customer service it generally helps the organization differentiate itself in the market, while if it helps to reduce costs it is generally supportive of a cost reduction strategy.

2.5.2.2 Value Chain Assessment

This is another scoring or ranking system. In this case the Michael Porter value added chain [20] is used as the basic checklist to which the organization's application systems are compared. This process may be conducted in terms of the organization's internal value activities as well as the industry value activities. For a through analysis, both approaches should be used. In a similar way to the strategic match analysis [2.5.2.1], evaluation weights may be associated with the more important systems and scores may be given on the basis of the degree to which these systems have been implemented and are achieving objectives.

2.5.2.3 Relative Competitive Performance

Some organizations assess their performance by comparing themselves to their competitors. This requires monitoring their competitors' acquisition of IT, the way they use it to achieve their goals and objectives. This is quite a difficult process and frequently rely on very subjective evaluations involving ranking and scoring.

2.5.2.4 Proportion of Management Vision Achieved

This is another ranking and scoring technique that has a high degree of subjectivity. Managers are asked to assess the current system in terms of what their original plans were. When a large number of managers are involved a questionnaire or survey approach may be used. Despite being subjective, this approach can be applied in a relatively objective way by conducting regular assessments on a six or twelve- monthly basis.

2.5.2.5 Work Study Assessment

The work study approach to IT benefit evaluation requires regular reviews of how the work in the department is being performed. During these reviews the volume of work is carefully recorded as well as the time required to perform all the necessary tasks. Work study assessment can be relatively objective particularly if work study professionals conduct it. The results of a work study appraisal may be used as input to subsequent cost benefit analysis.

2.5.2.6 Economic Assessment

An economic assessment is a theoretical approach to IT benefit evaluation. It requires the development of a model expressed in mathematical terms in which the relationship of input and output are expressed. Although applying rigorous mathematical terms this method also relies on subjective views of the nature of the relationships between the input and output variables.

2.5.2.7 User Attitudes

User attitudes may be used to assess how IT is performing within the organization. In this, a survey method is used to extract attitudes towards the importance of IT to the individual users, as well as how the administration is performing in its delivery of IT.

2.5.2.8 User Utility Assessment

It may be argued that systems that are heavily used are more successful than those that are not. By establishing the frequency of use of a system it is believed that it is possible to assess its value to the organization. This technique involves counting the amount of activity sustained by the system, measured in terms of its input, processing and output.

However, excellent systems have been known to fail for the trivial reasons, while poor systems have survived for years and therefore this approach leaves many questions unanswered.

2.5.2.9 Value Added Analysis

Using this technique the value of the system rather than its cost is firstly assessed. Once the value or benefit has been agreed then a cost is calculated. The system is then developed on a prototyping basis as a relatively low cost. Once this has been completed an assessment is made to decide whether the benefits derived have justified the cost. If the decision is that the investment is justified then the organization proceeds to the next stage in the IT applications development.

2.5.2.10 Return on Management

Return on management is a concept proposed by Paul Strassmann initially in his book Information Payoff (Strassmann, 1985) [16] and again in The Business Value of Computers (Strassmann, 1990) [17]. The return on management (ROM) method is a valued added approach that isolates the management added value and then divides this by the management cost.

When expressed as a formula:

$$\text{Management value added} = \text{ROM} / \text{management cost}$$

Management value added is the residue after every contribution to an organization's inputs is paid. If management value added is greater than management cost then management efforts are productive in the sense that outputs exceeds inputs.

2.5.2.11 Multi-Objective Multi- Criteria Methods

Multi-objective multi- criteria methods are subjective methods for appraising the value of different outcomes in terms of the decision makers own preferences. It assumes that the value of a project or IT investment may be determined or measured in terms other than money. Therefore, preferences are used instead of ROI, etc.

The philosophy behind multi-objective multi- criteria methods is that different stakeholders may have different ideas about the value of different aspects of an IT investment and that these may not be strictly comparable in money terms. This technique allows different views and values to be investigated and assists in exposing potential conflicts at the decision making stage.

Multi-objective multi- criteria methods are most useful when strategic choices have to be made between quite different alternatives.

2.5.3 Classification of Methodologies

Each of these methodologies leads to the development of a measure or metric that allows the IT to be evaluated. Sometimes the metric is compared to a standard or sometimes relative metrics are compared, for competing, systems. However, in most cases a single measure is not sufficient to make an evaluation. Two or three metrics will usually be required but six or seven measures should be avoided. These methodologies may be categorized as primarily objective or subjective in nature. However, even in more objectively oriented approaches the calculation of the metric will almost invariably be based on subjective criteria and any suggestion that the method is totally objective should

be resisted. Fig. 2.1 categorizes these measures in terms of their relative subjectivity/objectivity. [14]

Classification	Evaluation Approach
Partially Objective	Cost benefit analysis
	Economic analysis
	System usage
	User utility assessment
	Relative competitive performance
	Work study assessment
	Value added analysis
Fully subjective	User attitudes
	Management vision
	Value chain assessment
	Strategic match analysis

Table 2.1 Classification of Evaluation Methodologies

2.5.4 Limitations of these Methodologies

All approaches to IT benefit assessment have significant conceptual or practical flaws. This does not mean that they can not be or should not be used, but practitioners should be aware of their limitations. [14]

2.5.4.1 Strategic Match Analysis and Evaluation

- 1) Highly subjective
- 2) Issues not well understood
- 3) All but top management may be unaware of strategy

2.5.4.2 Value Chain Assessment

- 1) Very subjective
- 2) Difficult to obtain hard data
- 3) Not well understood by management

2.5.4.3 Relative Competitive Performance

- 1) Information available may be sketchy
- 2) Difficult to compare benefits of different systems
- 3) Uncertainty about competitors' plans

2.5.4.4 Proportion of Management Vision Achieved

- 1) No hard data
- 2) Virtually no objectivity in this approach to assessment
- 3) Not always easy to get top management to admit to failure

2.5.4.5 Work Study Assessment

- 1) Objectivity may be relatively superficial
- 2) Changes in work patterns may drastically alter the assessment
- 3) Most managers are not familiar with these techniques

2.5.4.6 Economic Assessment- I/O Analysis

- 1) Requires an understanding of economic analysis
- 2) Relatively abstract
- 3) Attempts to avoid detailed quantification of monetary terms
- 4) Most managers are not familiar with these techniques

2.5.4.7 User Attitudes and User Utility Assessment

- 1) A very technical approach
- 2) Not many practitioners available
- 3) Has only a low relevance to operating staff
- 4) Users may not tell the truth or may simply exaggerate.
- 5) Users may have vested interests in presenting a particular viewpoint
- 6) Corporate culture may color users' views and the interpretation of the outcome

2.5.4.8 Value Added Analysis

- 1) Very practical approach
- 2) Keeps costs under control
- 3) Encourages prototyping

2.5.4.9 Return on Management

- 1) A major break with classical economics
- 2) Not easy to operationalise
- 3) Useful to stimulate re-thinking

2.5.4.10 Multi-Objective, Multi- Criteria Methods

- 1) An unquantifiable method
- 2) Not useful as a post implementation tool
- 3) Useful to stimulate debate

2.5.5 A Holistic Approach to IT System Evaluation

The IT function of an organization is involved in the development, implementation and maintenance of numerous systems. These systems aim to meet needs at all levels within the organization. In evaluating the performance of the IT, it is normally necessary to evaluate the performance of the individual systems, and then use the aggregate of the performances on the individual systems as an overall measure of the success of the IT function.

Measurement of IT effectiveness is a key issue; unfortunately, there is little agreement on how to measure effectiveness.

The measurement problem is exacerbated by many ways in which effectiveness may be viewed. For an example a particular IT system can be considered effective when it:

- Is meeting its objectives
- Operates within its budgets
- Delivers on time
- Is a major catalyst in directing the organization's use of it
- Ensures that the organization is using it competitively
- Has a clear understood role in the system
- Is generally perceived to be an ally
- Is perceived by administration to be value for money and users believe that IT is being deployed in a way which supports their pursuit of excellence.

2.5.5.1 Goal Centred vs. Systems' Resources [8, 9]

There are basically two general views with respect to measuring IT effectiveness. These are

- Goal centred view
- Systems' resource view

In the Goal centred view we focus on the out comes of the IT function. We determine the task objectives of the system and then establish the criteria for measuring whether these objectives have been achieved.

In the systems' resources view we focus on the process or the functional aspects of the system. In this case effectiveness is measured against such things as user satisfaction, communication between IT staff and users, and quality of service.

There are a number of ways to measure the effectiveness of IT system. User information satisfaction (UIS) [11, 12] is recognized as an important indicator of IT effectiveness. It is on this approach to the measurement problem that we now concentrate, and in particular on perceptual measures of UIS. This involves incorporating user feelings, beliefs, opinions and attitudes toward IT into the evaluation procedure.

In the context of IT effectiveness, it is generally believed that if users declare themselves to be satisfied with the system then the system may be said effective. Clearly, such satisfaction measurement is at best an indirect and relative measure, which must be used with considerable care. It may be the case that users could be happy with inadequate system.

2.5.5.2 User Information Satisfaction (UIS) [11, 12]

User satisfaction is generally considered to result from a comparison of user expectations (or needs) of the IT system with the perceived performance (or capability) of the IT system on a number of different facets of the IT system. This is considered to be a holistic approach to systems effectiveness as it addresses the whole IT function rather than individual systems.

More specifically, overall attitude to the IT function can be considered to be influenced by the size and direction of the discrepancies (or gaps) between expectations and performance. A positive (negative) gap results when perceived performance exceeds (is

below) expectation. A large 'positive' gap can be interpreted as indicating that IT resources are being wasted, whereas a large 'negative' gap indicates a need for improved performance.

A variant to the above approach is to use the correlation between expectations and performance scores as a measure of 'fit'. The correlations provide a means for assessing the overall effectiveness of the IT function, where high positive correlations can be taken to imply 'consensus' of views.

Of the many published papers on UIS two will be discussed in more detail below, namely, the Miller and Doyle (1987) [12], and the Kim (1990) [11] papers. Both these studies propose conceptual models to explain UIS, thereby adding credence to the instruments developed from them. These models have their roots in the theory of organizational and consumer behavior. This is easy to comprehend if one accepts that the IT function impacts on the whole system and is aimed at satisfying the user.

2.5.5.3 A Gap Approach to Measurement

2.5.5.3.1 The Kim Model [11]

A feature of Kim's model is that UIS is considered to be influenced not only by post implementation experience of the IT system. The later is captured through the user's initial expectations of the IT system.

In this approach, UIS is measured by the discrepancy between the user's perception score of the IT performance and the user's expectation score of the IT. Further, the model describes how UIS is influenced by the discrepancies that arise during the developmental and service delivery processes. The developmental stage comprises two sub stages, namely, the determination of the IT requirements and the design and installation of the IT system. These various stages give rise to three gaps that influence the UIS. These gaps in turn may influenced by various factors. Examples include: user participation in defining the IT requirements; administration support, and the user training which is likely to impact on the gap between the actual quality of the IT system installed and the what user

perceives the quality to be through use of the system. There may be other factors which directly impact on the IT system, rather than indirectly through the gaps. The Kim model is represented diagrammatically in figure. 2.1

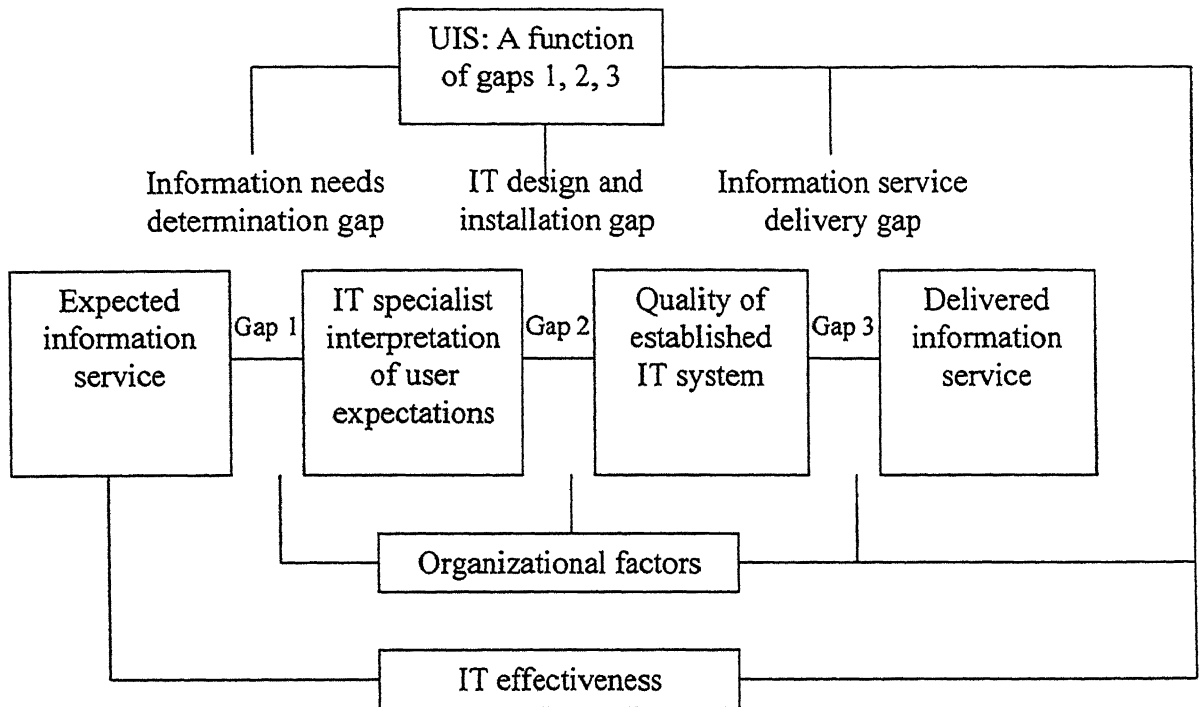


Figure 2.1 The Kim Model

Interpretation of the gaps

Gap 1 this is the discrepancy between the users' expectations of the IT and the systems designers' interpretations of these expectations.

Gap 2 this is the discrepancy between the IT specialist's interpretation of the users' needs and the quality of what is actually installed for the user.

Gap 3 this is the discrepancy between the quality of what is actually installed and what the user experiences when interacting with IT system.

Incorporation of organizational factors

The model postulates that the three gaps can be affected by organizational factors. For example, Gap 1 could be influenced in a positive way by encouraging user participation in the design stage. This involves determining the information requirements desired from the IT system. On the other hand, administration support for IT, exhibited through, say, the provision of enough resources should be positively correlated with Gap 2. Finally the provision of proper training should be positively correlated with Gap3.

Formulating and fitting the model

UIS is measured as the discrepancy between user expectations and the perceptions of the IT system. Furthermore, the model assumes that overall UIS can be explained by Gaps 1 to 3 and also organizational factors. More formally:

$$\text{UIS} = f(\text{Gap 1, Gap 2, Gap 3, Organizational factors})$$

To operationalise the model, it will be necessary in the first instance to develop instruments to measure three gaps. This should be possible by applying the methodologies used by researchers when modeling consumer satisfaction with quality of service, where consumer satisfaction is expressed as a function of a number of gaps [Parasuraman et al. 1985, 1988; Brown and Swartz, 1989]. The approach most used to conceptualize and determine the dimensions for the evaluation of the IT effectiveness is multivariate statistical analysis technique of factor analysis. Once these instruments are available it should be possible, through the use of correlation and regression analysis, to determine which organizational factors affect these gaps. Also, the extent and nature of the influence of the gaps and the identified organizational factors on overall UIS can be determined through the use of such statistical methods.

2.5.5.3.2 The Miller- Doyle Approach [12]

Of the many instruments proposed for measuring, through perception, user satisfaction with information systems, the one due to Miller and Doyle is described here (Miller and Doyle, 1987). It is, in spirit, similar to the conceptual model described above. The instrument has been extensively used in many different firms, in many different sectors, and the results provide convincing evidence of the instrument's reliability and validity.

Description of the instrument

The instrument is designed to measure the perceived effectiveness of the overall IT function and involves the use of a questionnaire. The questionnaire comprises five parts, A to E.

Part A consists of the questions which measure the extent to which certain facets of the IT system are perceived to be important in ensuring the organization's IT system is effective and successful. The attitudes are rated on a semantic differential scale of 1(irrelevant) to 7(very critical).

Part B consists of the questions on the future needs for IT system.

Part C consists of the same questions as Part A but in the case the respondent is asked to rate the questions with respect to the actual performance achieved. Again a seven point scale is used in this case the levels of perceived importance go from 1(very poor) to 7(excellent).

Part D consists of the questions relating to the organization's performance in developing new systems.

Part E consists of questions which capture certain demographic data. There is also a question which asks for a rating of the organization's overall IT performance on a scale of 1(complete failure) to 7 (very successful).

The important ratings in Parts A and B capture perceptions on the business needs, while the performance ratings in Part C and D capture perceptions of the organization's IT capabilities.

A factor analysis of these ratings revealed that there were seven dimensions of user satisfaction underlying the responses to these questions. These are:

- Functioning of existing transaction/ reporting systems.
- Linkage to strategic processes of the firm.
- Amount and quality of the user involved.
- Responsiveness to new systems needs.
- Ability to respond to end user computing needs
- IT staff quality
- Reliability of service.

Interpreting the results

The mean of the performance responses to each of the question can be taken as the measure of the perceived performance on each of the facets.

Overall user attitude to the IT function is measured by a composite score derived from the user performance mean ratings on the 38 questions, by calculating their mean value. This gives the user an overall assessment of the organizations IT capabilities.

The fit between importance and performance ratings can be measured by the square of the correlations between these scales, and/ or by the discrepancies (gaps) between these scales. Miller and Doyle recommend the use of the correlation as the preferred measure of success of the IT system.

3.1 Efficiency and Effectiveness Studies

The proposed model is based on a method [14] which is slightly different, but relatively close to measuring IT benefits, is that of conducting Value of the IT System (VITS) study.

The aim of the VITS study is to establish whether the IT system of IIT Kanpur is functioning efficiently and effectively.

3.2 VITS

The Value of the IT System (VITS) study is aimed at highlighting areas of excellence, as identifying those areas requiring remedial action. The study includes a discussion of the various areas in which an IT system may be improved, and the selection of a practical way of so doing with relation to the institute.

The deliverables of VITS study inter alia include:

- 1) A balanced report presented as objectively as possible highlighting the strengths and weaknesses of the IT system;
- 2) A better idea of how to use the resources available to IT system;
- 3) A more motivated IT system management team who, as a result of participating in the study, have been highly involved in assessing their own work and that of their colleagues;
- 4) A list of action points.

3.3 VITS of IITK: Setting up the Study

First step is to define and clarify objectives and the scope of the study in the direct relation to the institute;

Second step is to design a questionnaire or/ and interview for the survey according to the objectives and scope of the study;

Third step is to define the target sample which can answer the survey questions;

Fourth step is to execute the exercise of collecting data through questionnaire or/ and by interviews;

Fifth step is to analyze the data and finally;

Sixth step is to conclude and give suggestions for improvements.

3.3.1 Defining Objectives and Scope of the Study: Step 1

The precise scope of the study categorizes will vary extensively depending on the organization. For IIT Kanpur the following eleven identifiable areas are considered for setting up the study:

- 1) Awareness
- 2) Training
- 3) Time spent in learning
- 4) Hardware
- 5) Software
- 6) Internet and Networking
- 7) Utilization
- 8) Staffing

- 9) Service levels
- 10) Security
- 11) User support

3.3.1.1. Awareness

There is no use of any facility if the users do not know what they can avail. Awareness is a key area of the IT system. Awareness takes into account both users and administration's point of view like if administration is doing some thing to make users aware or not and also whether users are willing to know what facilities they are being provided.

3.3.1.2 Training

Training is an equally important area as awareness is. Main advantage of training is it saves time of the users. The commitment to training from the IT system will be examined as efficiency can be greatly enhanced if users are properly trained in applications they use.

3.3.1.3 Time spent in learning

It is important to know how much time users are spending only on the learning part. As far as IIT Kanpur is concerned time of our intellectual capital that is students, is far important then any other factor like economics of the IT system. So it is important to check whether students are spending more time in learning only or spending more time in application part.

3.3.1.4 Hardware and software

It is important to determine exactly what hardware and software exists in the institute, and what is in use in the institute. This will involve personal computers on the desks of

end users, as well as the equipments like scanner, printer plotter etc. The range of hardware configurations and versions of software in use is to be established. Establishment of a hardware and software asset register is a key component in any VITS study. Other aspects of the hardware and software inventory include what software is installed on machines, but not actually used by the user? What is the future plan for hardware and software growth?

The areas of hardware and software maintenance will be addressed. How much of this is outsourced and how much is performed internally?

3.3.1.5 Networks

This area will cover the issues like the current design and configuration of online networks in terms of efficiency. To find out whether networks have enough capacity and are performing to an efficient level. What is the loading and the downtime of the network and can this be improved? How many user connections are their currently and can this be increased?

3.3.1.6 Utilization

This area covers two very important factors of the IT system. One is miss use and the other one is under utilization. Both are equally bad for any of the system.

3.3.1.7 Staffing and Service Levels

This involves looking at the current agreements and commitments that the IT system has to users in terms of turnaround times, availability, response times, etc. If a service or help desk exists, its efficiency in terms of staffing and response time will be examined. What tools for recording problems and solutions are used?

3.3.1.8 Security

The study examines the computer related security like controls over input, processing, and output procedures. Special attention to the control of operating software will be given. What, if any, written procedures are there, and what happens in actual practice? How does the institute intend to minimize attacks from hackers and viruses?

3.3.1.9 User Support

How much support do users feel they get from IT system and how approachable do they feel IT system personnel are? Are requests dealt with promptly and sympathetically?

3.3.2 Designing a Survey: Step 2

3.3.2.1 What is a Survey?

A survey is a procedure for collecting information from individuals. The information sought can range from general background information to that relating to the beliefs, feelings, attitudes, life styles and intentions, etc. methods for obtaining such information usually fall in two categories, namely self completion and interview administered. Self completion methods include mail surveys, computerized surveys, and on board or in company surveys. Interview administered surveys include personal interviews, telephone, and on board surveys.

Each method possesses advantages and disadvantages. They do, however, all depend on the basic assumption that individuals subjected to questioning will be both willing and able to give truthful answers to the questions posed. [14]

In the present work both the methods are used.

Questionnaires of the Survey for our work are given in appendix I and II.

3.3.3 Defining Sample Type and Size and Data Collection: Step 3 and 4

Sample type means to whom the survey should be targeted. In our work target people are students and the IT lab administrators. Given the greater number of responses from the random sample for the student community there is 95 % confidence level [4.2.5]. Details of the student survey sample size and information regarding data collection are given in the next chapter. Administrative survey is qualitative in nature.

3.3.4 Analyzing the Results: Step 5

The performance of the IT system in each of the categories is assessed on a scale of four points. The Scale has categories: very good, good, average, poor and very poor with average being 2.5. The scores are derived by averaging views obtained at interviews and by collecting data using a questionnaire.

The results of the scores are presented in a number of different ways. One method of presentation, used by Coopers & Lybrand Deloitte, is that of wheel diagram. Another is a bar chart.

The scaling system and the analysis of results are given in detail in the next chapter.

3.3.5 Conclusion and Suggestions: Step 6

Based on the analysis, the VITS study indicates the current performance of the IT system of IIT Kanpur by mentioning strengths and weaknesses and how the performance may be improved. This is expressed through a list of action points according to the priority.

Conclusion and suggestions are given in Chapter 5.

4.1 The Survey

The survey was addressed to students and computer lab administrators. Two questionnaires were designed one each for students and administrators. Student survey questionnaire is given in appendix I and administrator survey questionnaire is given in appendix II. In both the surveys respondent were chosen **randomly**.

4.2 Student Survey

4.2.1 Survey Population

Student survey was of on board type. Hard copies of the questionnaire were distributed randomly in CC, Hall 1, Hall 2, Hall 3, Hall 4, Hall 5 and GH.600 copies were distributed out of which 564 people responded.

In the table 4.1 the statistics of the survey are given.

Number of students participated	600
Number of students responded	564
Number of UG students who responded	171
Number of PG students who responded	228
Number of students who did not mention their program	165

Table 4.1 Student Survey Population Statistics

Figure 4.1 and 4.2 shows the distribution of the survey population.

As the figure 4.1 shows that population contains 30% UG students, 41% PG students and 29% students did not specify their program.

Figure 4.2 shows that survey covered students of almost every branch or program running in IIT Kanpur.

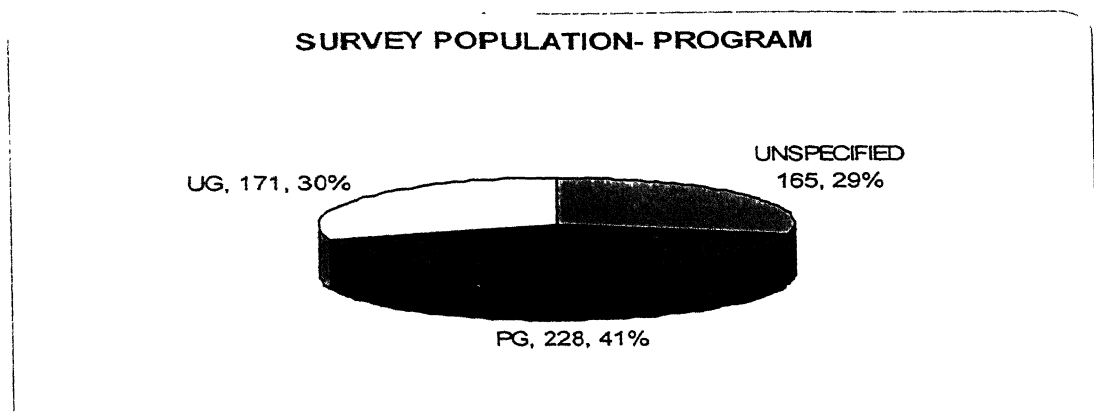


Figure 4.1

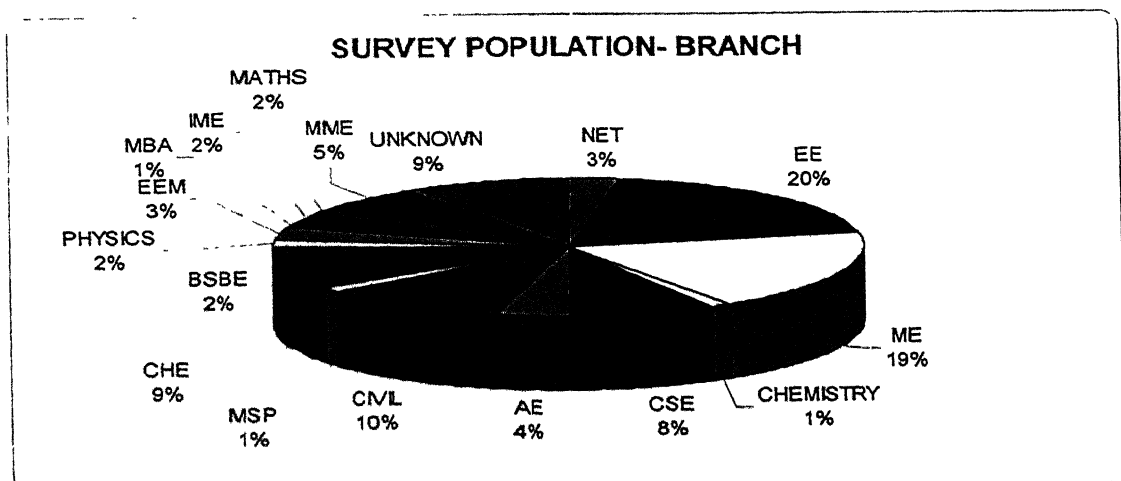


Figure 4.2

4.2.2 Rating System

Questions of the survey are grouped in eleven areas around which this study revolves. Weights have been assigned to the answers of each question according to their importance. Assignment of weights is a very subjective exercise and is a result of previous experience and brainstorming sessions. The objective of assigning weights to each alternative is to quantify the responses so that the IT system can be evaluated more effectively.

Some questions have 4 alternatives and some have 3 alternatives. Table 4.2 shows the

RANGE	RATING
$0.0 \leq X < 2.0$	VERY POOR
$2.0 \leq X < 2.5$	POOR
$2.5 \leq X < 3.0$	AVERAGE
$3.0 \leq X < 3.5$	GOOD
$3.5 \leq X < 4.0$	VERY GOOD

Where, X is the overall mean of a particular area.

Table 4.2 Ratings

range of weights and their corresponding rating. Based on these ratings weights have been assigned. 4 points or 1 point is assigned in extreme cases and 2.5 point is assigned in average case if there are three options and 4, 3, 2, 1 are assigned if there are four options.

Following is the list of areas with questions and weights assigned to their answers:

4.2.2.1 Awareness

1) Are you aware how many software/ packages do you have in your lab or in CC?

- | | |
|-------------------------------------|---|
| a) Fully aware | 4 |
| b) Aware about whatever is required | 3 |
| c) Not concerned | 2 |
| d) Not Aware | 1 |

2) Was there any orientation program held in the beginning for the awareness of IT facilities available in IIT Kanpur or at least in your lab?

- | | |
|---|---|
| a) Yes | 4 |
| b) Yes, there was a program but it was not sufficient | 3 |
| c) Not aware | 2 |
| d) No | 1 |

4.2.2.2 Training

Is there any training facility available for the software you worked on?

- | | |
|---------------------------|---|
| a) Yes | 4 |
| b) Yes but not sufficient | 3 |
| c) Not Aware | 2 |
| d) No | 1 |

4.2.2.3 Time Spent

If the training facility was not available then what was the estimated fraction of time spent on non productive work like figuring out which software to use, how to access it and how to use it?

- | | |
|-------------------------------------|---|
| a) < 25 percent | 4 |
| b) Between 25 percent to 50 percent | 3 |
| c) Between 50 percent to 75 percent | 2 |
| d) > 75 percent | 1 |

4.2.2.4 Hardware

Are hardware facilities available in IIT Kanpur sufficient?

- | | |
|---|---|
| a) Yes | 4 |
| b) Yes, but there is a room for improvement | 3 |
| c) No | 2 |
| d) Pathetic | 1 |

4.2.2.5 Software

Are software/packages available in IIT Kanpur sufficient?

- | | |
|---|---|
| a) Yes | 4 |
| b) Yes, but there is a room for improvement | 3 |
| c) No | 2 |
| d) Pathetic | 1 |

4.2.2.6 Internet and Networking

Are net connection and other networking facilities available in IIT Kanpur sufficient?

- | | |
|---|---|
| a) Yes | 4 |
| b) Yes, but there is a room for improvement | 3 |
| c) No | 2 |
| d) Pathetic | 1 |

4.2.2.7 Utilization

Are students misusing the IT facilities available in IIT Kanpur?

- | | |
|--------------|-----|
| a) Yes | 1 |
| b) Can't say | 2.5 |
| c) No | 4 |

Are students under utilizing the IT facilities available in IIT Kanpur?

- | | |
|--------------|-----|
| a) Yes | 1 |
| b) Can't say | 2.5 |
| c) No | 4 |

4.2.2.8 Services

Have you ever complained to the concerned person regarding the unavailability or inaccessibility of a particular software?

- | | |
|--|-----|
| a) Yes, action was taken for the complaint | 4 |
| b) No such case was found | 2.5 |
| c) Yes, but no action was taken | 1 |

4.2.2.9 Staff

Do you find the supporting staff:

1) Technically capable

- | | |
|------------|-----|
| a) Yes | 4 |
| b) Average | 2.5 |
| c) No | 1 |

2) Approachable

- | | |
|---------------|-----|
| a) Yes | 4 |
| b) Not always | 2.5 |
| c) No | 1 |

3) Helping

- | | |
|---------------|-----|
| a) Yes | 4 |
| b) Not always | 2.5 |
| c) No | 1 |

4.2.2.10 Security

Do you find the IT System secure?

- | | |
|---------------------------|---|
| a) Absolutely secure | 4 |
| b) Reasonably secure | 3 |
| c) Not secure | 2 |
| d) Dangerously vulnerable | 1 |

4.2.2.11 User Support

1) Is there any online/offline help available for the availability, accessibility of software packages?

- | | |
|--------------|-----|
| a) Yes | 4 |
| b) Can't say | 2.5 |
| c) No | 1 |

2) Were extra needs like more hard disc space, parallel computing, use of plotter etc taken care of whenever required?

- | | |
|--------------|-----|
| a) Yes | 4 |
| b) Can't say | 2.5 |
| c) No | 1 |

4.2.3 Summary of Results

In figure 4.3 mean scores of each area are shown by the help of the bar chart and in Table 4.3 summary of the results is provided.

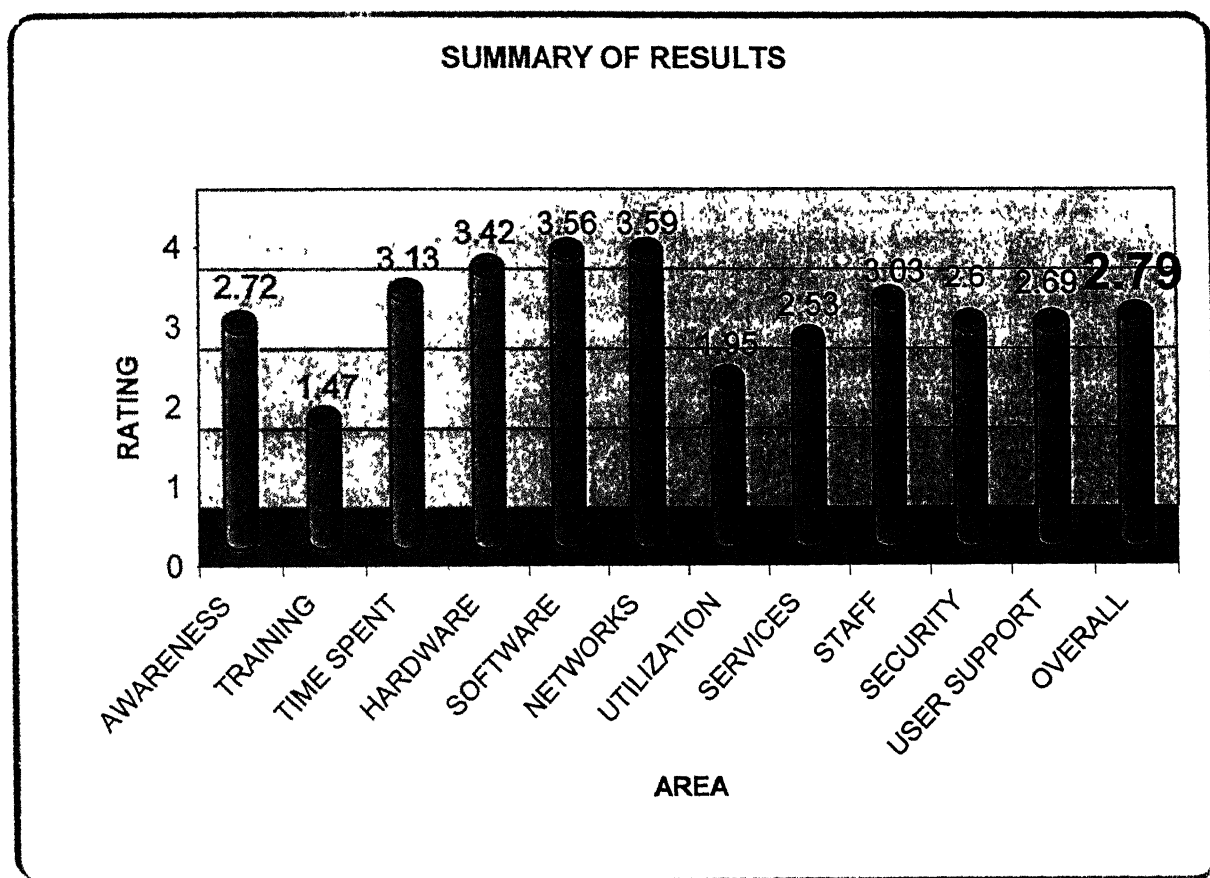


Figure 4.3

SR.NO.	AREA OF STUDY	SUB AREA MEAN	MEAN	RATING
1	AWARENESS		2.72	AVERAGE
	Awareness to s/w, h/w available	3.03		
	Orientation program for awareness	2.42		
2	TRAINING	1.47	1.47	VERY POOR
3	TIME SPENT	3.13	3.13	GOOD
4	HARDWARE	3.42	3.42	GOOD
5	SOFTWARE	3.56	3.56	VERY GOOD
6	NETWORKS	3.59	3.59	VERY GOOD
7	UTILIZATION		1.95	VERY POOR
	Miss use	1.95		
	Under utilization	1.95		
8	SERVICES	2.53	2.53	AVERAGE
9	STAFF		3.03	GOOD
	Technical Capability	3.19		
	Approachable	2.88		
	Helping	3.03		
10	SECURITY	2.61	2.61	AVERAGE
11	USER SUPPORT		2.69	AVERAGE
	Availability of online/offline help	2.71		
	Extra needs	2.67		
	OVERALL MEAN		2.79	AVERAGE
	STANDARD DEVIATION		0.661	

Table 4.3 Summary of Results: Student Survey

As the results shows, in almost half of the areas system is doing just average. In networking and software areas system is doing a very good job.

IT system of IIT Kanpur is doing very badly in providing training to their users and utilization of the system; these areas have managed just 1.47 and 1.95 points respectively with a rating of 'very poor'. Overall the IT system has got 2.79 points which is rated as 'average'.

Results are discussed in detail in the next section.

4.2.4 Wheel Diagram

The results of the study are presented here as a wheel diagram [Coopers & Lybrand Deloitte]. Wheel diagram is as shown in figure 4.4. This concept has been adopted to accommodate the eleven scope categories using the ratings given in table 4.3. The area of the polygon produced by joining the scores is a reflection of the VITS the institute receives. If the area is, the VITS is considerable, whereas if the area is small the VITS is low.

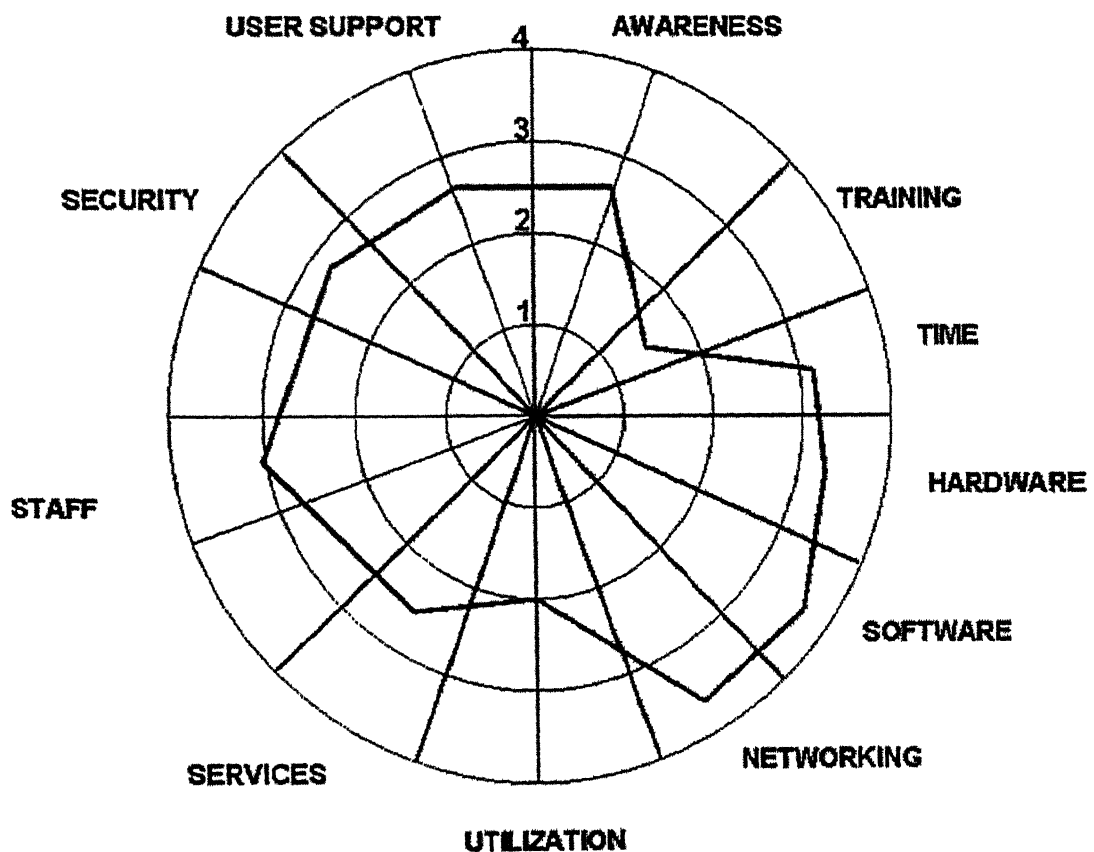


Figure 4.4

It is evident from the wheel diagram that the area of the polygon is not very large. It means that the VITS is neither considerable nor low, its average. Area left out of the result line gives an idea about the room for improvement in the respective areas.

4.2.5 Confidence Interval

The $(1 - \alpha) * 100\%$ confidence interval estimate for the mean with population mean unknown is expressed as follows

$$(\bar{X}) \pm t_{n-1} \frac{S}{\sqrt{n}}$$

Where t_{n-1} is the critical value of the t distribution with $n-1$ degrees of freedom for an area of $\alpha/2$ in the upper tail. (\bar{X}) is the sample mean and S the sample standard deviation is the estimate of population standard deviation. For the sample size greater than 120, S estimates precisely enough the population standard deviation. [1]

For our sample

$$(\bar{X}) = 2.79$$

$$S = 0.661$$

$$n = 564$$

For 95% confidence level

$$t_{563} = t_{\infty} = 1.9600$$

We would conclude with 95% confidence that the mean score of the IT system of IIT Kanpur is between 2.79 ± 0.055 i.e.

$$2.735 \leq \mu_x \leq 2.845$$

The 95% confidence interval states that we are 95% sure that the population means μ_x is located within the interval 2.735 and 2.845. In other words, if all possible samples of size 564 were selected (something that would never be done in practice), 95% of the intervals developed would include the true population mean somewhere within the interval.

4.2.6 Detailed Results and Discussion

In this section results are shown in full details. Details are given of each and every question of the questionnaire. In the last, comments given by the students for the open ended question are given though some comments are placed in between at the appropriate place. Responses to every question are depicted by three pie charts, one of responses given by UG students, one is of responses given by PG students and the third one is combined (including those who did not mention their program).

"Three years ago we were 6th in IT facilities in Asia but now we are 19th. This shows that people around are advancing faster than we are. IITK has been known for it's computing facilities thus a humble request to improve the facilities to make them one of the best in Asia"

-- Student comment

4.2.6.1 Awareness

OVERALL POINTS	2.72
OVERALL RATING	AVERAGE

1.1) Are you aware how many software/ packages do you have in your lab or in CC?

- a) Fully aware
- b) Not concerned
- c) Aware about whatever is required
- d) Not Aware

POINTS	3.03
RATING	GOOD

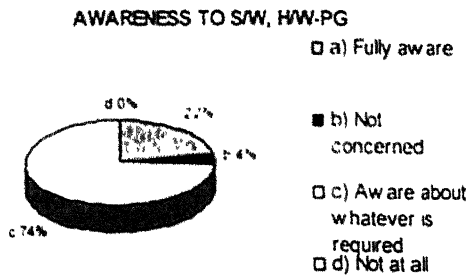


Figure 4.5

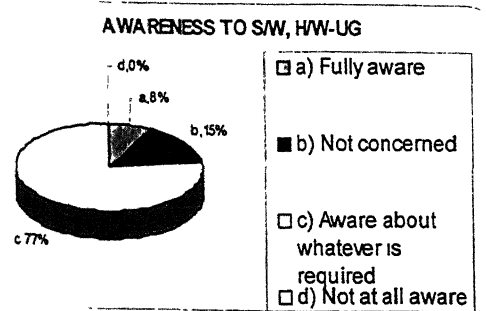


Figure 4.6

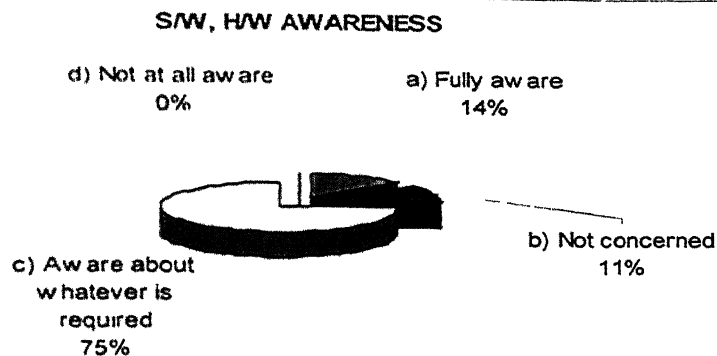


Figure 4.7

As the above charts demonstrate most of the students are aware only about whatever is required. Very less number of students said that they are fully aware of the IT facilities.

"The facilities and this survey all is in vain if the users are not aware of whatever is being provided. To get better output students should be made aware first about how to use facilities."

-- Student comment

1.2) Was there any orientation program held in the beginning for the awareness of IT facilities available in IIT Kanpur or at least in your lab?

- a) Yes
- b) Yes, there was a program but it was not sufficient
- c) Not aware
- d) No

POINTS 2.42

RATING POOR

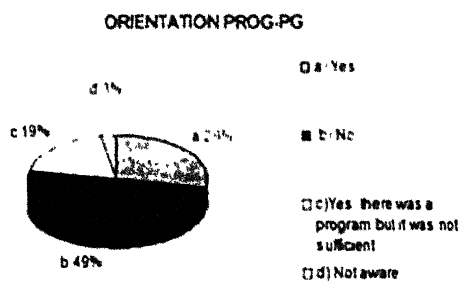


Figure 4.8

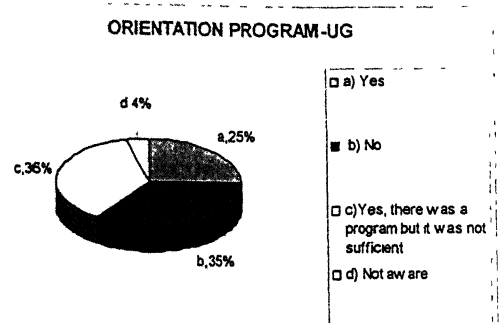


Figure 4.9

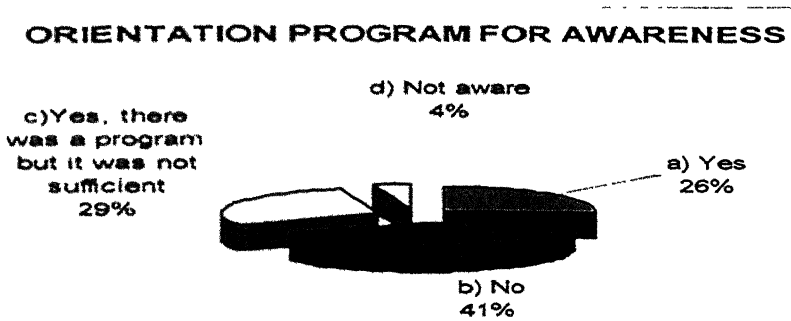


Figure 4.10

In this section UG students slightly disagree to each other. UG says that there was an orientation program while PG says no there was not. Reason may be that most of the UG students are CC users while majority of the PG students use their departmental labs. Overall opinion is that there is no orientation program for the awareness of the IT facilities in IIT Kanpur.

4.2.6.2 Training

POINTS 1.47

RATING VERY POOR

Is there any training facility available for the software you worked on?

a) Yes

- b) Yes but not sufficient
- c) Not Aware
- d) No

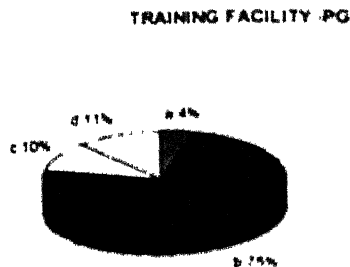


Figure 4.11

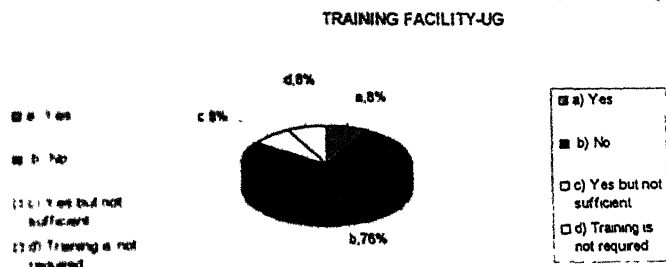


Figure 4.12

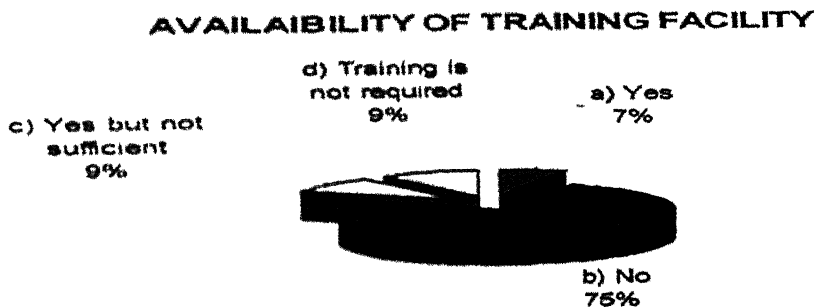


Figure 4.13

As the above charts demonstrate population as large as 75% says that there is no training facility available for the software etc. they work on. Point here to appreciate is that there is also an option of "training not required" but only 9% says that training is not required. It means that majority says that training is required but it is not being provided.

"A person who gets facilities like this should feel more than content. Of course it would be appreciable if some body will teach working on certain software."

-- Student comment

It is indeed a major area of concern and undoubtedly the most ignored area among all the facilities provided.

4.2.6.3 Time Spent

POINTS 313

RATING GOOD

If the training facility was not available then what was the estimated fraction of time spent on non productive work like figuring out which software to use, how to access it and how to use it?

- a) < 25 percent
- b) Between 25 percent to 50 percent
- c) Between 50 percent to 75 percent
- d) > 75 percent

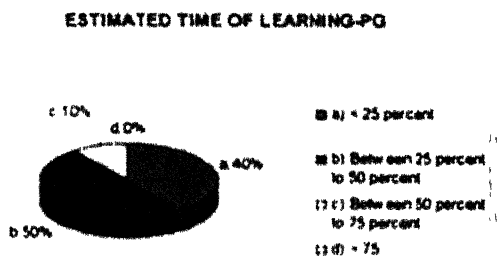


Figure 4.14

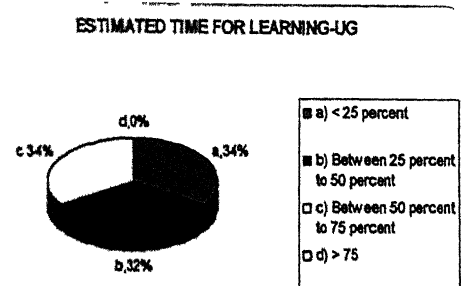


Figure 4.15

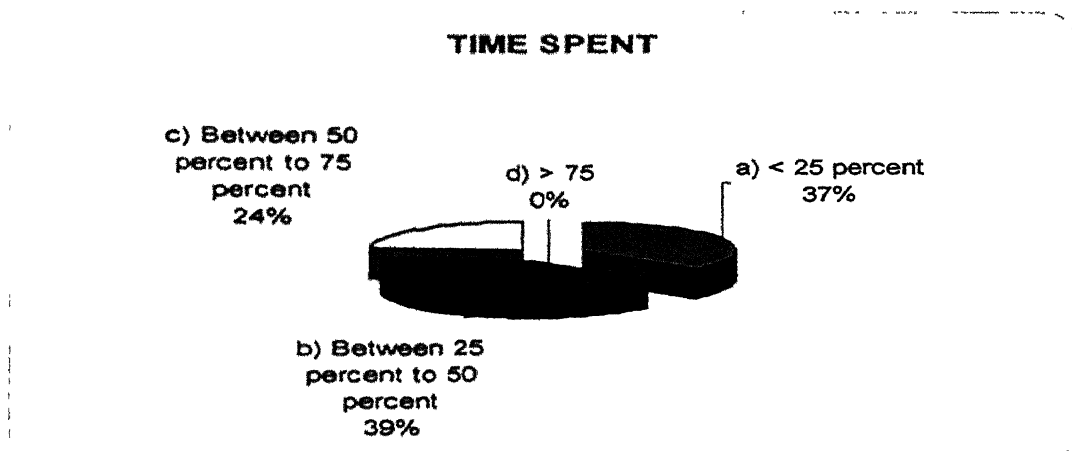


Figure 4.16

Statistics shows that a good population of students spends 25% to 50 % time only in learning the software. Can this time be reduced by providing training?

4.2.6.4 Hardware

POINTS 3.42

RATING GOOD

Are hardware facilities available in III Kanpur sufficient?

- a) Yes
- b) Yes, but there is a room for improvement
- c) No
- d) Pathetic

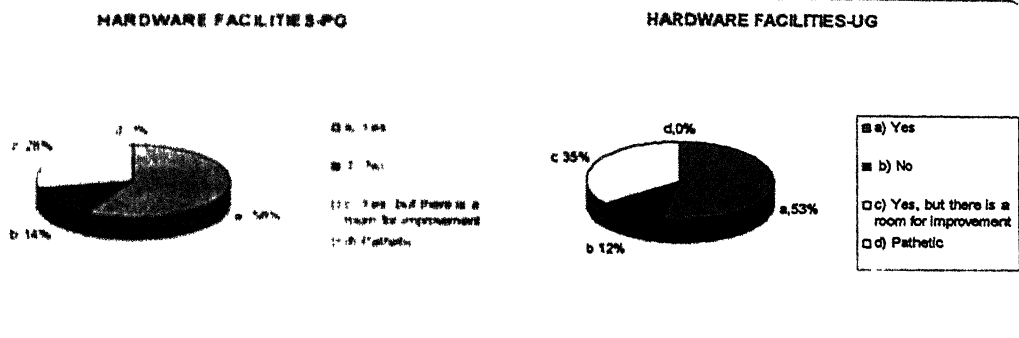


Figure 4.17

Figure 4.18

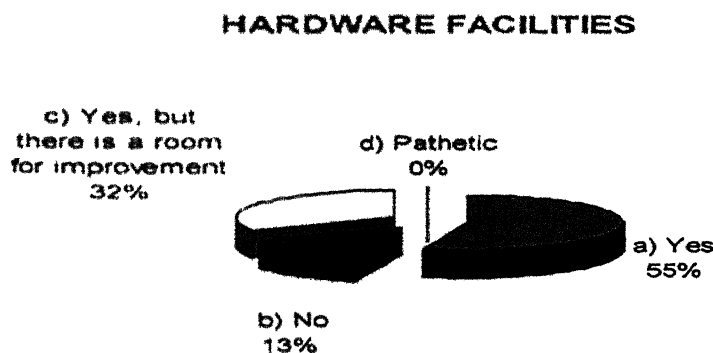


Figure 4.19

Most of the students say that hardware facilities are good. But a different point was put by some users in the open ended question.

"Few labs in IIT Kanpur have best possible machines and other facilities whereas some labs do not have even a single PC"

--- Student comment

Well no doubt that the hardware facilities are good as the majority says but facilities are not consistent through out the IIT.

4.2.6.5 Software

POINTS 3.56

RATING VERY GOOD

Are software packages available in IIT Kanpur sufficient?

- a) Yes
- b) No
- c) Yes, but there is a room for improvement
- d) Pathetic

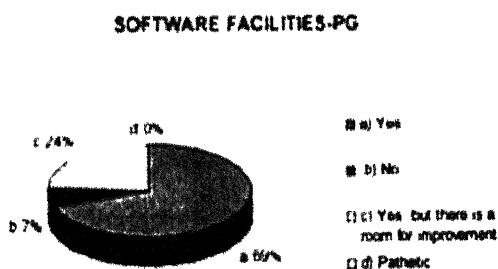


Figure 4.20

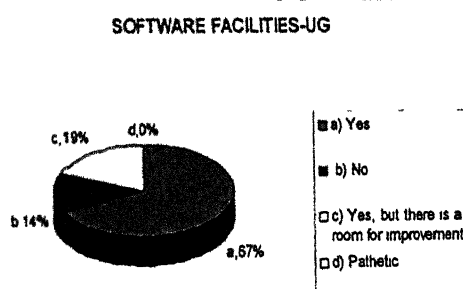


Figure 4.21

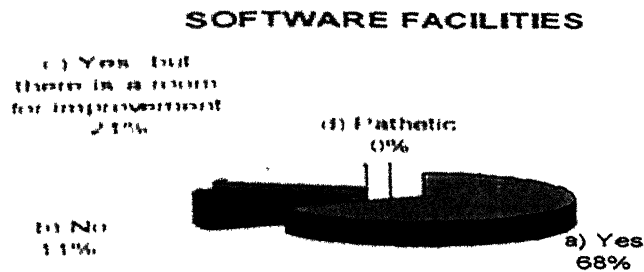


Figure 4.22

As the above charts depict that most of the users are very much satisfied with the software facilities.

"IT facilities provided in IIT Kanpur are best possible."

-- Student comment

4.2.6.6 Internet and Networking

POINTS 3.59

RATING VERY GOOD

Are net connection and other networking facilities available in IIT Kanpur sufficient?

- a) Yes
- b) No
- c) Yes, but there is a room for improvement
- d) Pathetic

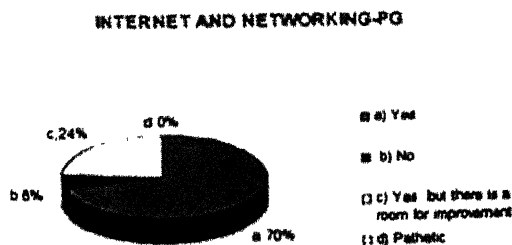


Figure 4.23

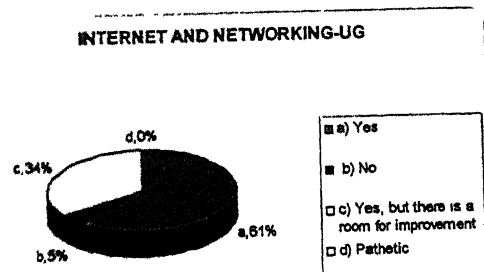


Figure 4.24

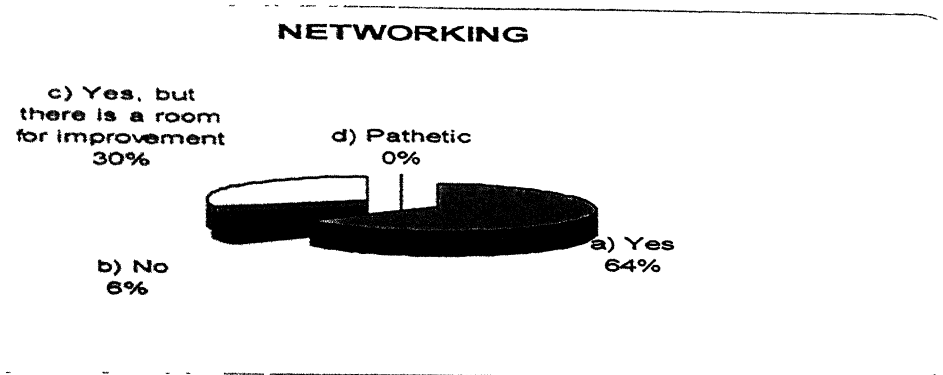


Figure 4.25

Most of the students are satisfied with the internet and networking facilities. This facility is rated as “very good” along with the software facilities.

4.2.6.7 Utilization

OVERALL POINTS 1.95
OVERALL RATING POOR

6.1) Are students misusing the IT facilities available in IIT Kanpur?

- a) Yes
- c) No
- b) Can't say

POINTS 1.95
RATING POOR

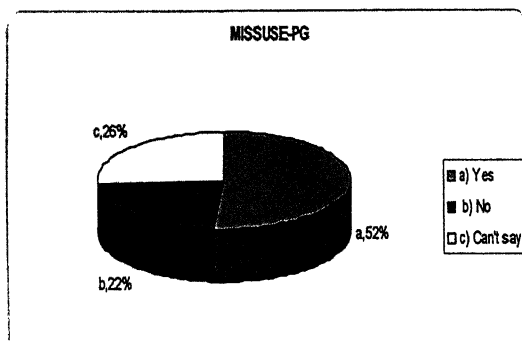


Figure 4.26

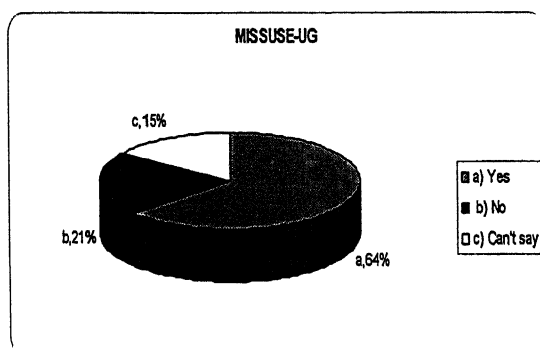


Figure 4.27

MISS USE

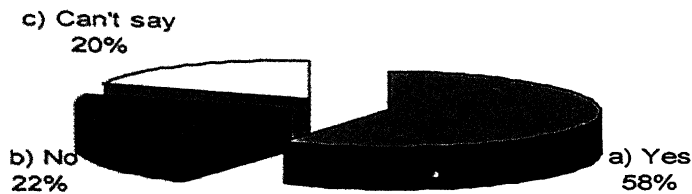


Figure 4.28

This can be appreciated that students by themselves realize that the facilities are being heavily miss used. Obviously it is not good for the system.

"Abuse of internet should be checked, especially in the night"

-- Student comment

"It's disgusting to see that when one really needs a PC for some urgent assignment and PC is not available because some body else is playing Games"

-- Student comment

6.2) Are students under utilizing the IT facilities available in IIT Kanpur?

- a) Yes
- b) Can't say
- c) No

POINTS 1.95

RATING POOR

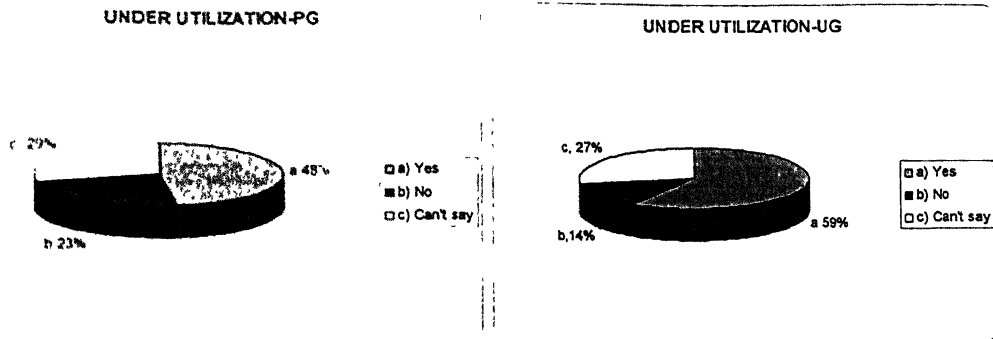


Figure 4.29

Figure 4.30

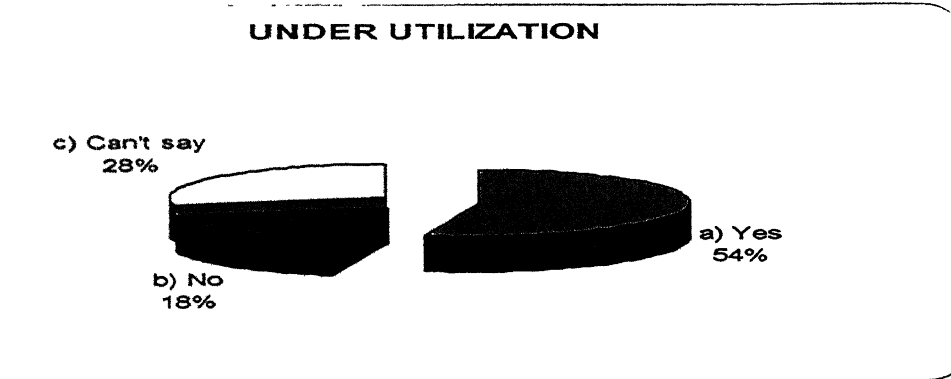


Figure 4.31

Almost the same percentage of students who says that system is being miss used, also says that system is heavily under utilized. Does it means that first the students are not using the system properly and if using then most of them are doing unproductive work?

"Students are not using even the 50% of the facilities"

-- Student comment

4.2.6.8 Services

POINTS 2.53

RATING AVERAGE

Have you ever complained to the concerned person regarding the unavailability or inaccessibility of a particular software?

- a) No such case was found
- b) Yes, but no action was taken

c) Yes, action was taken for the complaint

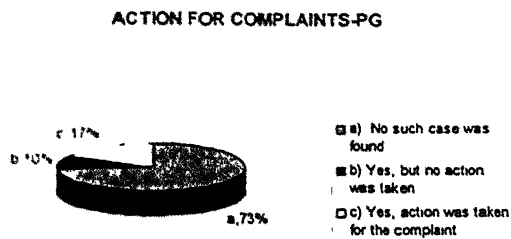


Figure 4.32

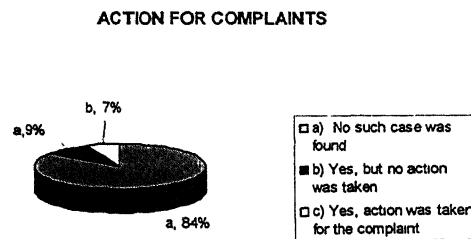


Figure4.33

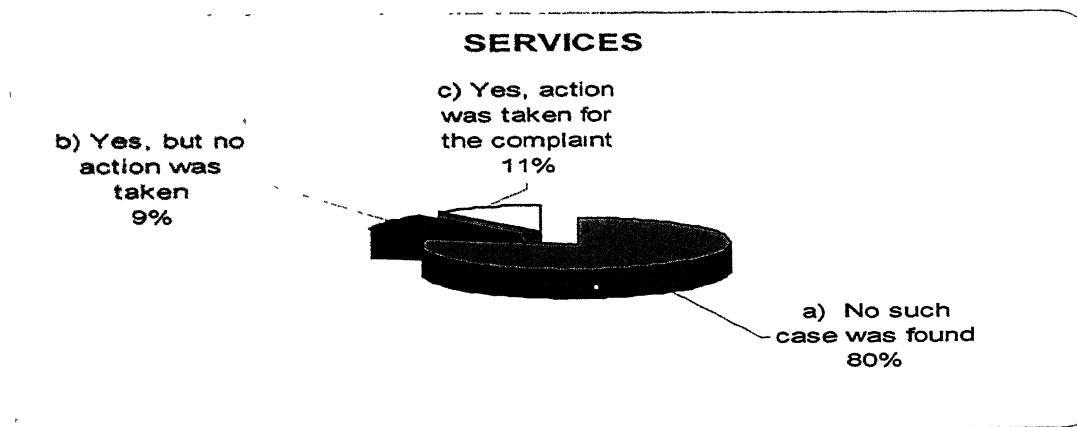


Figure 4.34

A very large population, almost every body says that they never encountered such type of case but there is a different picture also which came in front through open ended question but that population is not big enough to establish any fact.

"Does it possible to complain?"

-- Student comment

4.2.6.9 Staff

OVERALL POINTS	3.03
OVERALL RATING	GOOD

Do you find the supporting staff-

1) Technically capable

a) Yes

b) Average

c) No

POINTS 3.19

RATING GOOD

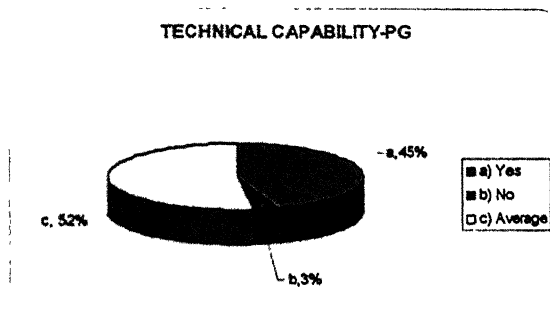


Figure 4.35

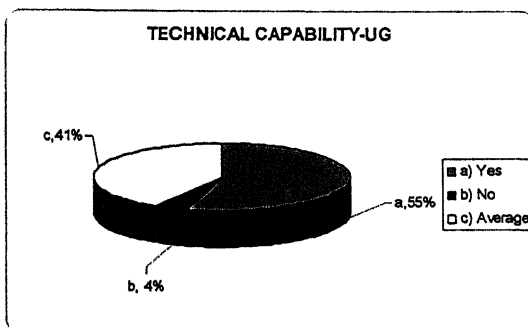


Figure 4.36

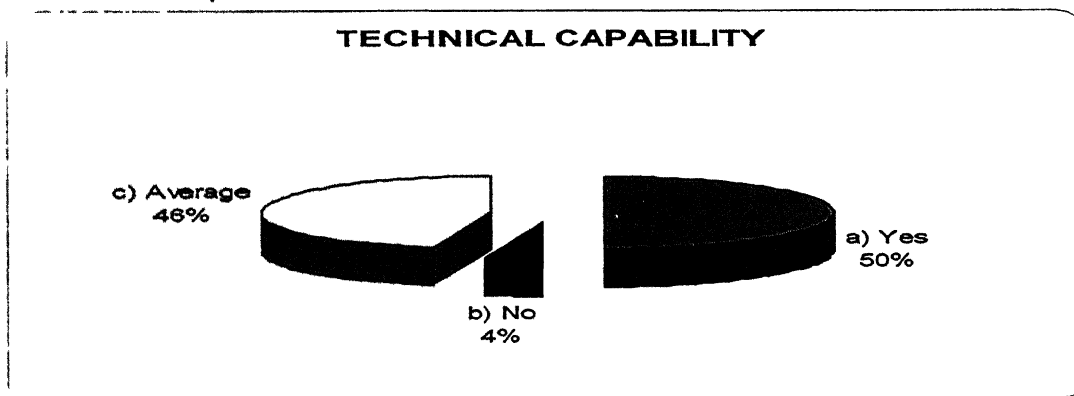


Figure 4.37

Half of the students think that the supporting staff is technically capable. But there were some surprising comments regarding the supporting staff.

“Does the supporting staff exist?”

-- Student comment

Almost all the comments of this type were given by CC users only.

2) Approachable

a) Yes

b) Not always

c) No

POINTS 2.88

RATING AVERAGE

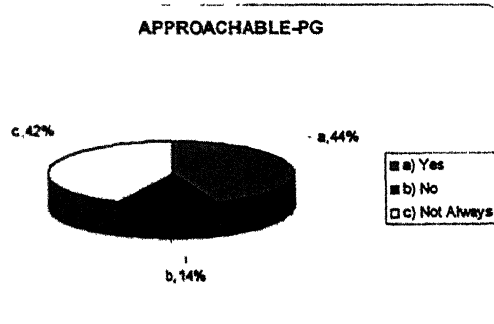


Figure 4.38

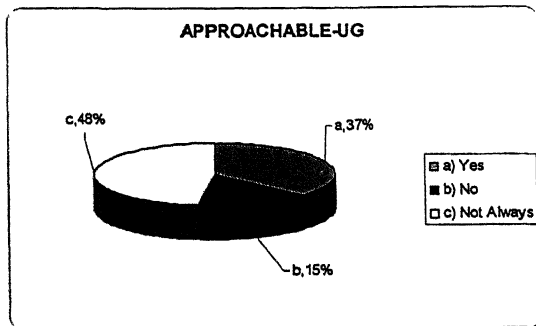


Figure 4.39

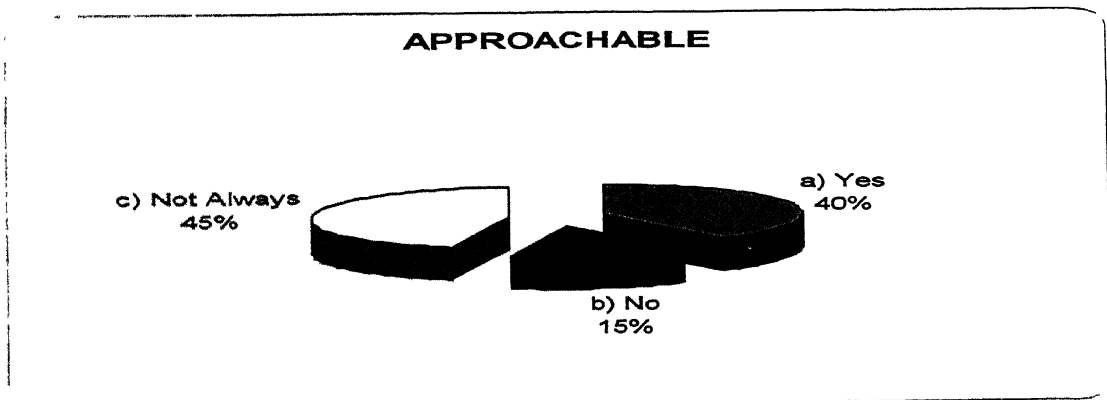


Figure 4.40

Almost a 'good' rating by students as far as approach to staff is concerned.

3) Helping

a) Yes

b) Not always

c) No

POINTS 3.03
RATING GOOD

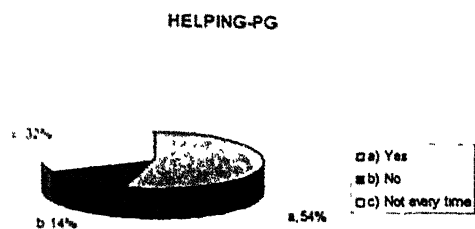


Figure 4.41

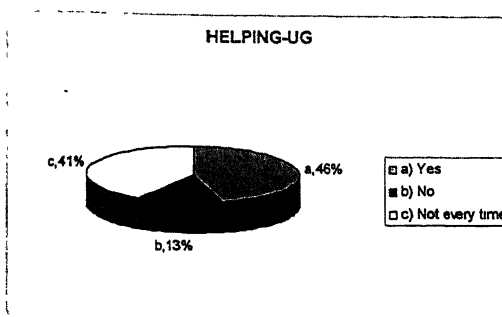


Figure 4.42

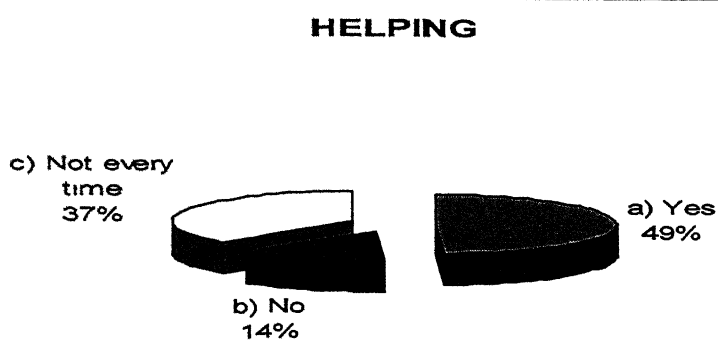


Figure 4.43

As the above charts depict in this area as well students find the supporting staff good.

4.2.6.10 Security

POINTS 2.61
RATING AVERAGE

Do you find the IT System secure?

- a) Absolutely secure
- b) Reasonably secure
- c) Not secure
- d) Dangerously vulnerable

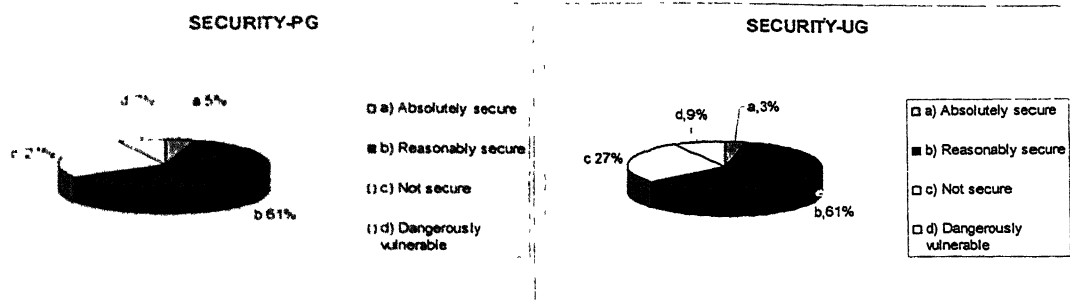


Figure 4.44

Figure 4.45

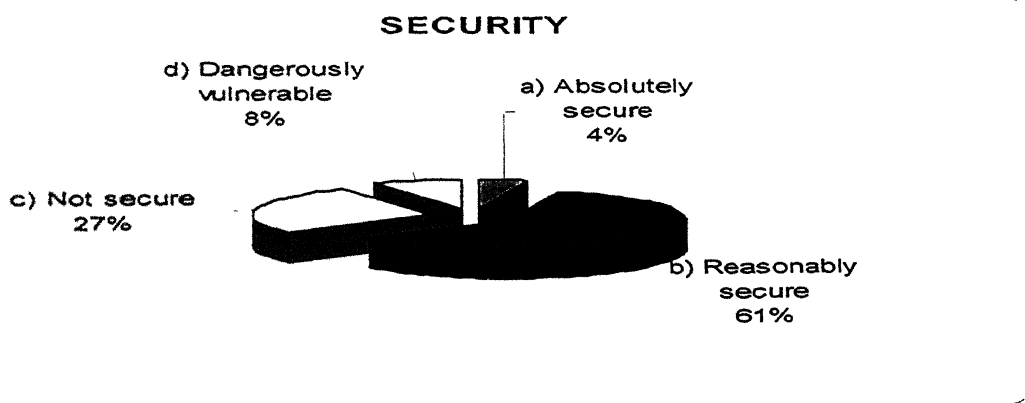


Figure 4.46

A good population of people thinks that the IT system of the IIT Kanpur is reasonably secure though overall it is rated as average.

4.2.6.11 User Support

OVERALL POINTS 2.71
OVERALL RATING AVERAGE

10.1) Is there any online/offline help available for the availability, accessibility of software packages?

- a) Yes
- b) Can't say
- c) No

POINTS 2.67
RATING AVERAGE

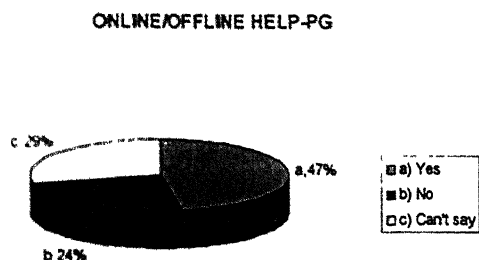


Figure 4.47

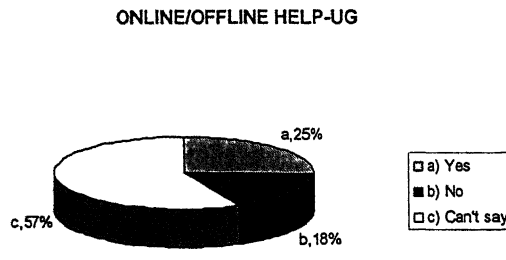


Figure 4.48

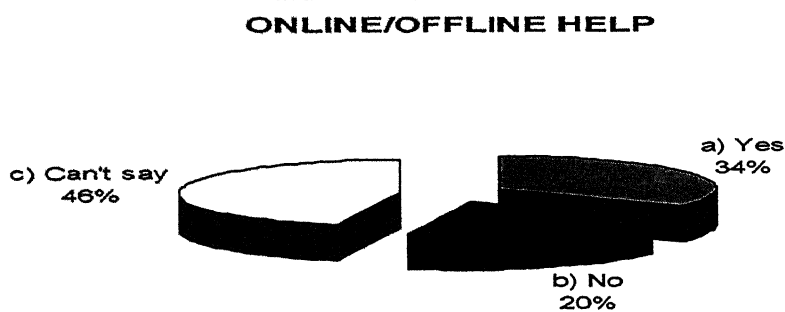


Figure 4.49

As evident from the feed back that almost half of the people are even do not know whether online/ offline help is available. It is equally bad as the help is not available. It again shows the fact which was established by the first question that students are not aware of the facilities provided by the IIT Kanpur.

“A few digital tutorials on important and most frequently used software would be welcome”

-- Student comment

10.2) Were extra needs like more hard disc space, parallel computing, use of plotter etc taken care of whenever required?

- a) Yes
- b) Can't say
- c) No

POINTS 2.6
RATING AVERAGE

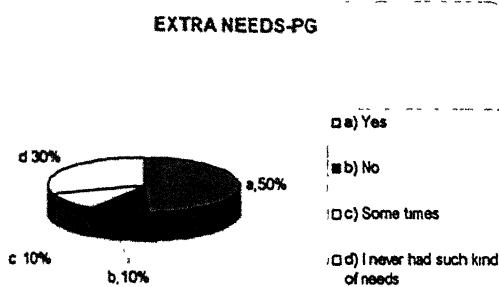


Figure 4.50

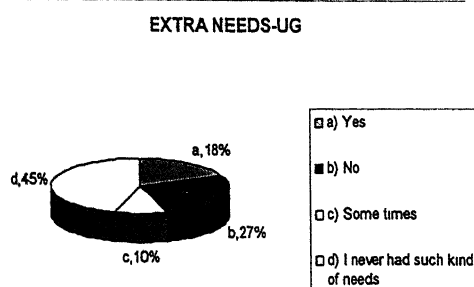


Figure 4.51

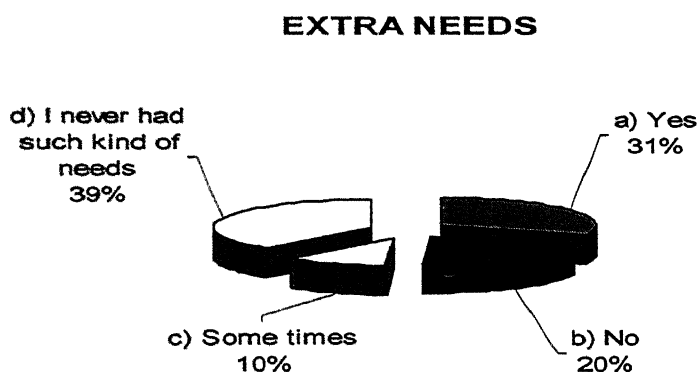


Figure 4.52

In this area UG students and PG students differ considerably. Almost half of the UG students say they never had such kind of needs on the other hand almost same percentage of PG students say that Yes needs were taken care of. Reason may be that PG students require more such kind of things due to their specialized field of study or may be because of thesis work.

Though overall rating of this area is average but it can be considered as good due to favorable response of PG students.

4.3 Some Other Statistics: Discussion Continued

Some questions were asked just from the point of view of statistics. Responses to those questions are as follows:

Do you have a PC in your room?

- a) Yes
- b) No

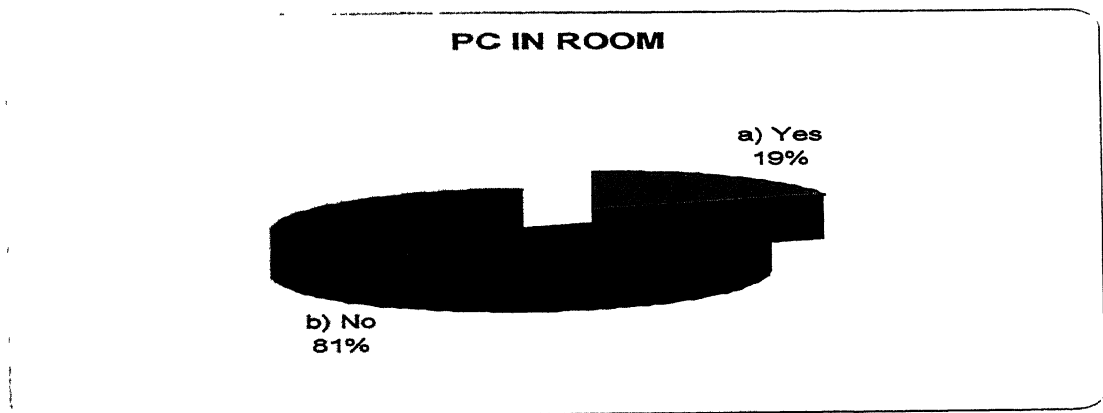


Figure 4.53

If YES, you bought it because

- a) PC was not always readily available
- b) Wanted to avail the facilities to the fullest
- c) Can't say

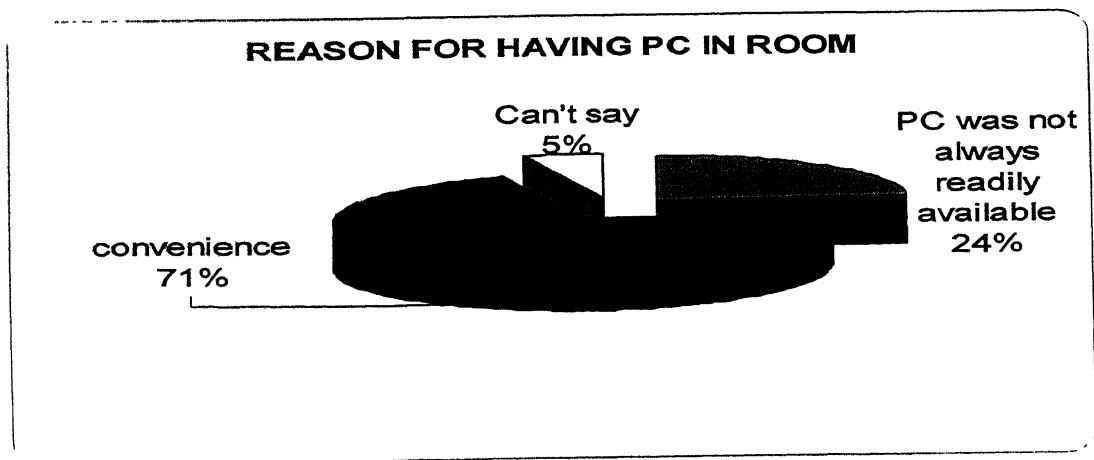


Figure 4.54

What flaws do you find in the IT/ computing facilities in your lab/CC.?

- a) Software required for a particular task is not available or the older version is available
- b) Hardware is not compatible to the software
- c) Computer is not available every time
- d) Accessibility of the software
- e) Training/ help manuals are not available
- f) Never knew that such kind of software is available
- g) Any other _____

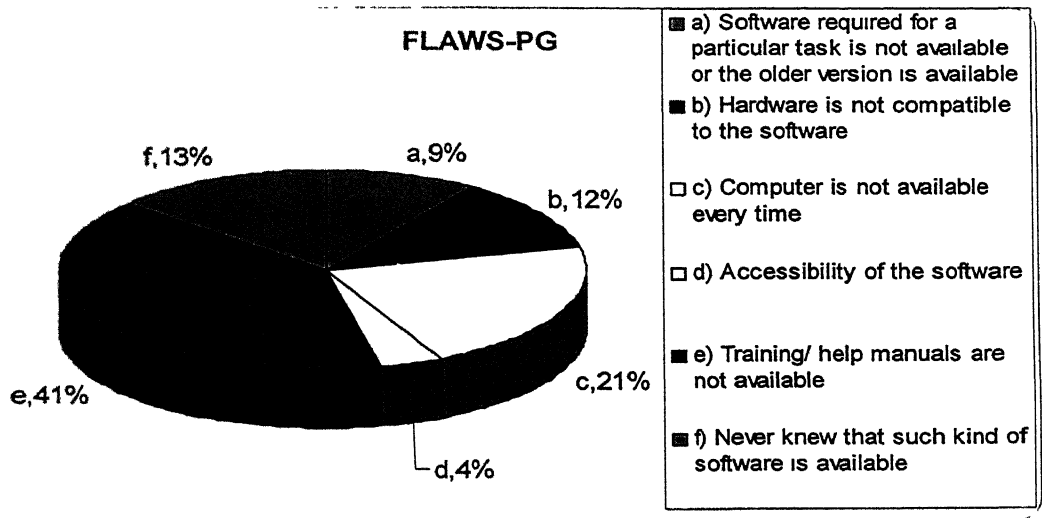


Figure 4.55

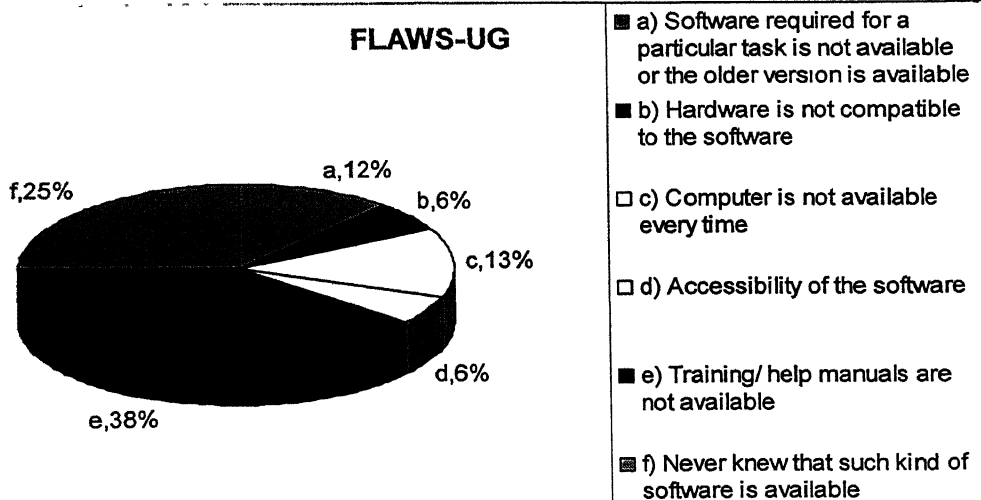


Figure 4.56

RESPONSE TO OPEN ENDED QUESTION

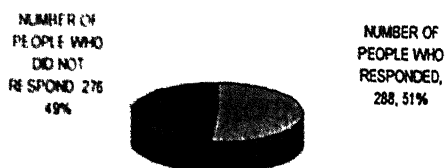


Figure 4.58

POPULATION RESPONDED OPEN ENDED QUESTION

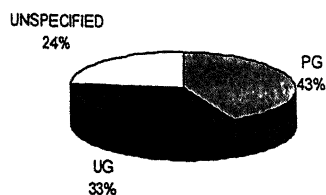
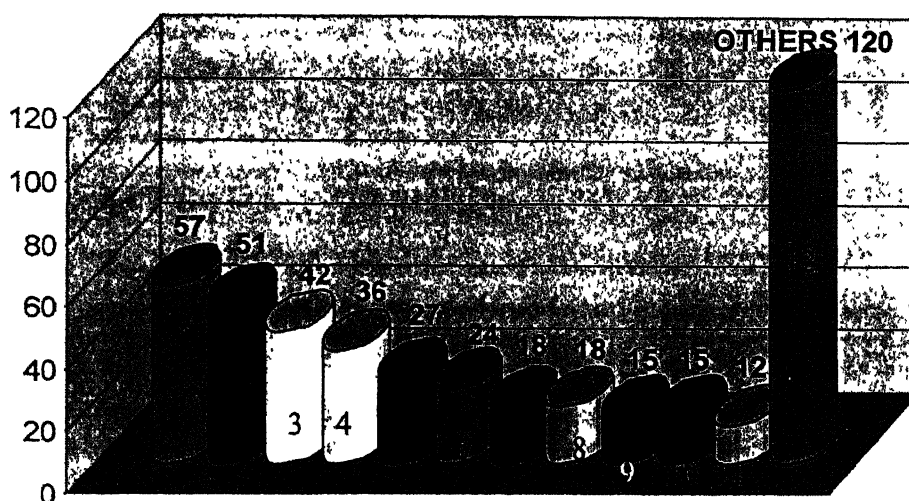


Figure 4.59

4.4.2 Main Responses

MAIN COMMENTS



1. Training is not available for software
2. 24 hours internet facility should be made available in CC
3. Internet speed is very slow
4. IT facilities are best possible/sufficient
5. People are not aware of available facilities/ There is a need of awareness program
6. A large number of PCs does not work properly/Maintenance is poor
7. More Hard disc space should be given to the students
8. More software should be made available/ Required s/w not available
9. Miss use of computing/ internet facilities is very high
10. LAN speed is very slow
11. Online help should be made available
12. Others

Figure 4.60

4.4.3 Summary of Student Concerns

COMMENT	RESPONSES
People are not aware of available facilities/ There is a need of awareness program	27
Internet speed is very slow	42
More software should be made available/ Required s/w not available	18
Online help should be made available	12
LAN speed is very slow	15
24 hours internet facility should be made available in CC	51
IT facilities are best possible/sufficient	36
RAM is less in many systems	3
Many games are not available	3
PC should be made available in rooms also	9
Training is not available for softwares	57
CC management team/ supporting staff is not helpful/rude	9
Printer is not accessible always specially on Sunday when it is needed the most	6
Improvement is needed	3
Laser printing should be made cheaper	3
Older version of software is installed	6
Help manuals are not helpful	3
Miss use of computing/ internet facilities is very high	15
Students do not care of the facilities provided	3
Facilities are not availed even to 50% of its capacity/ under utilization	6
Server down time is very high	9
System is not secure	3
PCs should be upgraded	3
A large number of PCs does not work properly/Maintenance is poor	24
More Hard disc space should be given to the students	18
I do not know whether supporting staff exists?	6
Some times when one really needs a PC somebody else is playing games/ watching a movie	3
CC should maintain a library of the books related to the software/ hardware which is in use	3
Number of PCs should be increased in NT lab (CC)/ in any other lab	9
Mostly only demo version is available	3
Help manuals are not accessible	3
No audio output in many machines	3
Laser printing facility should be made available for 24 hours	3
Installation permission of software should be given	6
Space is not sufficient	3
Systems get hanged very frequently	3
Networking is not proper in GH	3
Chatting should be allowed	3
TOTAL NUMBER OF COMMENTS	435

Table 4.5 Main Concerns Expressed by the Students

4.5 Administration Survey

In this survey the target population was IT lab administrators. In some labs administrators were faculty members while in some labs administrators were the people who are meant for that job only. This survey was personal interview type. Questionnaire for this survey is given in appendix II.

4.5.1 Survey Population

There are around 100 computer labs in IIT Kanpur out of which 30 lab administrators were chosen randomly almost from every department including CC. The responses do not have much variation; almost every administrator said similar things. This survey is kept purely qualitative in nature.

4.5.2 Results and Discussion

In this section results are given in detail question by question.

4.5.2.1 How many software/ packages do you have in your lab? Is their any list of software maintained for users?

In answer to this question only a few said that they have been maintaining a list. Specifically only two departmental labs and CC have this kind of facility.

This confirms the student opinion that there is no awareness program regarding IT facilities. Only CC conducts an awareness program every year for this but most of the students said that it is not sufficient [Section 4.2.6.1]. No other lab provides such kind of awareness program.

4.5.2.2 How a decision regarding the purchase of software or hardware takes place?

Most of the administrators said that software is purchased on requirement basis and it is not a very complicated procedure to decide what to buy. As far as hardware is concerned it depends on a number of things like student- machine ratio, technology up gradation, budget etc.

4.5.2.3 Is there any record for the frequency of use of particular software?

None of the lab maintains such kind of record and most of them think that it is not required either.

4.5.2.4 After the purchase of particular software do you provide some training of that software to the students?

Only a few labs provide some initial training which is most of the times provided by the firm from which the software is purchased. Training manuals are available in most of the labs but as it is evident from student survey that training manuals are not helpful most of the times.

One interesting point was raised by some of the people that students are not interested in training. A number of times tutorials have been arranged but a very few students turned up.

4.5.2.5 How many software are found redundant? What is the reason of redundancy? Is it because of

- a) Accessibility**
- b) Lack of proper training**
- c) Ambiguously written help manuals**
- d) Poor support by the software firm**
- e) Software is similar to any other software**
- f) Updated version is not available**
- g) Hardware compatibility**
- h) Any other**

In most of the labs no such case was found. In a couple of labs there were such cases but they all had same reason that the software they purchased went free later on.

4.5.2.6 What kind of contract do you have with the software company? Commercial, educational etc.

Almost every lab buys educational version of the software. Some administrators also said that some times using pirated versions as far as trial is concerned.

4.5.2.7 Are there any complaints that due to unavailability of particular software a certain task could not be carried out? If yes then what was the reason of unavailability? What action was taken?

Normally some action was immediately taken if the requirement was genuine but a number of times requirements were not found genuine. Though in most of the labs there is no formal feedback system for the users and verbal feedback usually takes place.

4.5.2.7 How the budget is allocated?

Budget allocation depends on the previous year's budget as well as the current year's projections. Money also comes from some other sources like consultancy and commercial projects. Most of the administrators said that money normally is not a big problem.

4.5.2.8 Is the IT system secure?

Most of the administrators said the system can not be made totally secure. Students are made aware of the security issues time to time, but some students intentionally use the channels which are insecure or are indulge in activities like hacking. They said it is more of moral responsibility issue then the technical issue,

4.5.2.9 Any thing else you would like to share?

A majority of the population did not share their views but a good number of people showed their concerns towards the miss use of the system. Some people also said that the facilities are not uniform through out the IIT for example in some departments laser printing is free while some others charge money which is less then the CC printer. This is causing problem.

5.1 Ranking

Based on the results of the study the identified areas are ranked which represents their performance and contribution to the IT system of IIT Kanpur. Ranks are given in Table 5.1.

RANK	AREA OF STUDY
1	Internet and Networking
2	Software Facilities
3	Hardware Facilities
4	Time Spent
5	Staff
6	Awareness
7	User Support
8	Security
9	Services
10	Utilization
11	Training

Table 5.1 Ranking

5.2 Strengths of the IT System

Following are the strengths of the IT system of IIT Kanpur-

- Internet and Networking facilities
- Software Facilities
- Hardware Facilities

Users are quite satisfied with these facilities. These areas are working effectively and efficiently. Point of concern is only that these facilities are directly or indirectly dependent on the other areas. Poor performance of other areas may cause harm to the performance of these facilities.

5.3 Weaknesses of the IT System

Following are the weaknesses of the IT system of IIT Kanpur-

- Training Facility
- Utilization

Users are not at all satisfied with the training facility provided for the computing work. In fact there is nothing like providing training in any of the labs. Both students and administration think that there is a very heavy miss use of facilities as well as the facilities are under utilized.

These two areas need some special attention of the administration and awareness among students.

5.5 Action Points (Priority wise)

Following action points are suggested to improve efficiency and effectiveness of the system:

1. Development of a web page with involvement of each and every department. It should contain the list of software, packages and machines and other hardware available in respective departments. This web page should also contain a few tutorials of the most frequently used software. It will help in overcoming the problems of training, awareness and underutilization.
2. Training should be provided for the software most frequently used on departmental level.
3. Miss use of the facilities should be checked. This can be done by more involvement of administration and through awareness among the students.

4. A help desk should be provided in CC. A feedback system should be established through this help desk. For departmental labs also feedback system should exist. It will help in improving user support.
5. A library maintaining help manuals and related books should be established in CC.
6. Facilities through out the institute should be made consistent.
7. In some labs pirated softwares are used, this practice is unethical and should be avoided.
8. Filtering of net access should be made more effective.

References

1. Berenson, M.L. and Levine, D.M. Basic Business Statistics.
2. Brown, S. W. and Swartz, T. A. (1989) "A Gap Analysis of Professional Service Quality", Journal of Marketing, April.
3. Brynjolfsson, E. (1993) "The Productivity Paradox of Information Technology: Review and Assessment", Communications of the ACM, December.
4. Davenport, T. H. (1993) Process Innovation: Reengineering Work Through Information Technology, Harvard Business School Press, Cambridge, MA.
5. Economist, (1991) "IT Investment", 24 August p. 75.
6. Farbey, B. Land, F. and Targett, D. (1993) IT investment: A Study of Methods and Practices, Butterworth- Heinemann, Oxford.
7. Farbey, B. Land, F. and Targett, D. (1995) "A taxonomy of information systems application: the benefits' evaluation ladder", European Journal of Information Systems, vol.4, no. 4.
8. Hamilton, S. and Chervany, N.L. (1981 a) "Evaluating Information Effectiveness – Part II: Comparing Evaluation Approaches", MIS Quarterly, vol.5, no. 4, December.
9. Hamilton, S. and Chervany, N.L. (1981 b) "Evaluating Information Effectiveness – Part I: Comparing Evaluation Approaches", MIS Quarterly, vol.5, no. 3, September.

10. Hopwood, A.G. (1983) "Evaluating Real Benefits", in H.J. Otway and M. Peltu(eds) *New Office Technology, Human and Organizational Aspects*, Chapman and Hall, London.
11. Kim, K. (1990) "User Information Satisfaction: Towards Conceptual Clarity", in J. De Grosse, M. Alavi and H. Oppeland (eds) *Proceedings of 11th International Conference on Information Systems*, Copenhagen, pp.183-191.
12. Miller, J. and Doyle, B.A. (1987) "Measuring the Effectiveness of Computer Based Information Systems in the Financial Services Sector" *MIS Quarterly*, vol. 12, no. 2, June.
13. Remenyi, D. and Money, A. H. (1993) " Service Quality and Correspondence Analysis as Diagnostic Tools in Determining the Problems Associated with the Effective Use of Computer Services", in D. Remenyi and E. Whitley (eds) *Proceedings of the First European Conference on Information Systems*, Henley Management College, Henley-on-Thames, March.
14. Remenyi, D., Money, A. H., Smith, M.S. and Irani, Z. *The Effective Measurement and Management of IT Costs and Benefits*, Second Edition.
15. Solow, R. M. (1987) "Review of S.S. Cohen and J Zysman "Manufacturing Matters: The Myth of the Post Industrial Economy", *New York Book Review*, 12th July.
16. Strassmann, P. A. (1985), *Information Payoff: The Transformation of Work in the Electronic Age*, Free Press, New York.
17. Strassmann, P. A. (1990) *The Business Value of Computers*, Information Economy Press, CT.

18. Symons, V. (1991) "A Review of Information Systems Evaluation: Content, Context and Process", *European Journal of Information Systems*, vol.3, no. 1, pp. 205-212.
19. Ward, J., Taylor, p. and Bond, P. (1996) "Evaluation and Realization of IS/IT benefits: An Empirical Study of Current Practices", *European Journal of Information Systems*, vol.5, no. 4, pp. 214-225.
20. www.themanager.org/pdf/ValueChain.PDF Competitive Advantage: Creating and Sustaining Superior Performance (1985)

Appendices

I. Student Survey

Evaluation of IT scenario in IIT Kanpur

Questionnaire for the survey

UG/PG/PHD

Branch _____ . Department lab/CC/Both

NOTE: You can tick any number of options.

1) Are you aware how many software/ packages do you have in your lab or in CC?

a) Fully aware

b) Not concerned

c) Aware about whatever is required

2) Was there any orientation program held in the beginning for the awareness of IT facilities available in IIT Kanpur or at least in your lab?

a) Yes

b) No

c) Yes, there was a program but it was not sufficient d) Not aware

3) Which software/ package you use most frequently? (Preference wise)

1) _____

2) _____

3) _____

4) Is there any training facility available for the software you worked on?

a) Yes

b) No

c) Yes but not sufficient

d) Training is not required

5) If the training facility was not available then what was the estimated fraction of time spent on non productive work like figuring out which software to use, how to access it and how to use it?

- a) < 25 percent
- b) Between 25 percent to 50 percent
- c) Between 50 percent to 75 percent
- d) > 75 percent

6) What flaws do you find in the IT/ computing facilities in your lab/CC.?

- a) Software required for a particular task is not available or the older version is available
- b) Hardware is not compatible to the software
- c) Computer is not available every time
- d) Accessibility of the software
- e) Training/ help manuals are not available
- f) Never knew that such kind of software is available
- g) Any other _____

7) Are IT facilities available in IIT Kanpur sufficient?

1) Hardware facilities

- a) Yes
- b) No
- c) Yes, but there is a room for improvement (please mention what improvement do you want _____.)

2) Software/packages available

- a) Yes
- b) No
- c) Yes, but there is a room for improvement (please mention what improvement do you want _____)

3) Net connection and other networking facilities

- a) Yes
- b) No
- c) Yes, but there is a room for improvement (please mention what improvement you want _____)

8) Are students misusing the IT facilities available in IIT Kanpur?

- a) Yes
- b) No
- c) Can't say

9) If YES, what resources are misused?

- a) Printer, scanner, cd writer etc
- b) Net facilities
- c) Hard disk space

10) Are students under utilizing the IT facilities available in IIT Kanpur?

- a) Yes
- b) No
- c) Can't say

11) Have you ever complained to the concerned person regarding the unavailability or inaccessibility of a particular software?

- a) No such case was found
- b) Yes, but no action was taken
- c) Yes, action was taken for the complaint

12) How do you find the supporting staff?

1) Technically capable:

- a) Yes
- b) No
- c) Average

2) Approachable:

- a) Yes
- b) No
- c) Not Always

3) Helping:

- a) Yes
- b) No
- c) Not every time

13) Do you have a PC in your room?

a) Yes

b) No

14) If YES, you bought it because

a) PC was not always readily available

b) Wanted to avail the facilities to the fullest

c) Can't say

15) Is there any online/offline help available for the availability, accessibility of software packages?

a) Yes

b) No

c) Can't say

16) Were extra needs like more hard disc space, parallel computing, use of plotter etc taken care of whenever required?

a) Yes

b) No

c) Some times

d) I never had such kind of needs

17) Do you find the IT System secure?

a) Absolutely secure

b) Reasonably secure

c) Not secure

d) Dangerously vulnerable

18) Any thing else you would like to share regarding IT facilities in IIT Kanpur.

II. Administration Survey Questionnaire

Evaluation of the IT Scenario in IIT Kanpur

Questionnaire for the survey

ADMINISTRATION

- 1) How many software/ packages do you have? Is their any list of software maintained for users?
- 2) How a decision regarding the purchase of software takes place?
- 3) Is there any record for the frequency of use of particular software?
- 4) After the purchase of particular software do you provide some training of that software to the students?
- 5) How many software are found redundant? What is the reason of redundancy? Is it because of
 - a) Accessibility
 - b) Lack of proper training
 - c) Ambiguously written help manuals
 - d) Poor support by the software firm
 - e) Software is similar to any other software
 - f) Updated version is not available
 - g) Hardware compatibility
 - h) Any other
- 6) What kind of contract do you have with the software company? (Commercial; educational etc).
- 7) Are there any complaints that due to unavailability of particular software a certain task could not be carried out? If yes then what was the reason of unavailability? What action was taken?
- 8) How the budget is allocated?
- 9) Is the IT system secure?
- 10) Any thing else you would like to share?



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